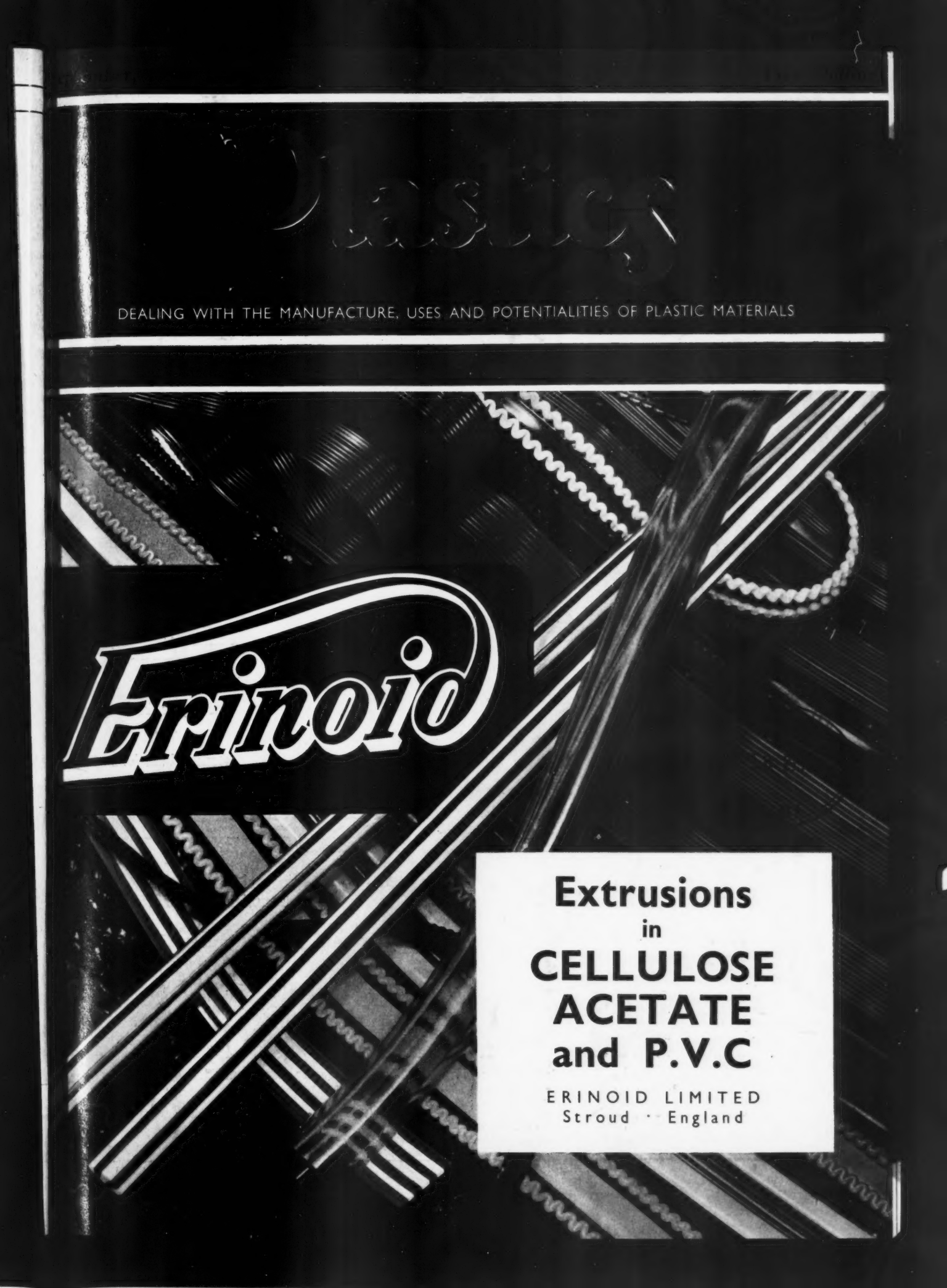
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Plastics

VOL. XV. No. 160 SEPTEMBER, 1950

" Because of her sweet soft flesh the oyster attracts a host of . . . gourmands. . . . Some enter . . . while the gates are standing negligently open. Others force an entrance with all the long-protracted methods of sapping and tunnelling. These latter the defender opposes with walls continually renewed. For as they bore towards her she gives forth a barricade of varnish, varnish that hardens almost instantaneously and becomes as stone. With the evilly disposed guests entering by the front door the oyster has a different way. It happens frequently that a sweet-toothed shrimp or little crab gains a sly entrance into the castle before the chatelaine becomes aware of his presence. Driven on like drift-weed he is carried into the castle yard before the gates can be shut. But this is his only victory. For presently he will die a horrible death in sight of the delicious Trophy upon which he has staked his all. Already the gates have swung to behind him. He is a prisoner for whom there is no escape. This, however, he does not as yet realize, for he is busy stropping one claw against another preparatory to carving the joint. Now he wants to draw nearer. But he cannot lift his legs. They are held fast by a viscous liquid which, even as it oozes, hardens slightly and pins him down. Claws to the rescue ! Down they come to free the legs and like the legs are caught and held. And presently there is another submarine tragedy and another crab is buried in conchioline."

"Pearls and Men," by Louis Kornitzer (1935).

EDITORIALS

Surplus Tool Exchange

AN organization has just been formed under the name of Tool Exchange, Ltd., for the trading of surplus British moulding tools to Continental and British Commonwealth plastics moulders. It is a step that possesses the element of common sense from a strictly economic point of view. Furthermore, it possesses the possibility of even greater collaboration in all branches of the industry here and abroad.

It is now an old story how, when the last war ended and in spite of much destruction, this country emerged with a plastics industry strongly coherent and with a capacity 200 to 300 per cent. greater than it had been in 1939. All Europe, South America, Africa and parts of Asia turned to us and to the U.S.A., whose system had not suffered at all and whose plastics industry had grown at even a greater rate, for their needs. There were two simultaneous demands: one for finished plastics goods, the other for self-sufficiency in the very same goods, which expressed itself in wide-spread inquiries for the tools to make them. Great Britain fared well in the change-over to peace, exported large quantities of mouldings and fabricated plastics and in two or three years increased its production of compression, injection, extrusion machines and tools to a very high level.

By 1947, however, largely as a result of the drive for self-sufficiency or the very praiseworthy attempts by some countries to regain pre-war technical levels that had been destroyed by German invasion, a sharp decline in our export of finished goods took place. The condition still holds except for especially difficult mouldings and those resulting from new ideas or those which form part only of exported non-plastic structures. On the other hand, the export of machines continues to flourish. It is also equally pleasing to note that there is a considerable export of new moulds, a direct result of the exceptionally high quality of the tools produced here. We note that one famous concern of tool makers advertises the fact of such exports to Holland, Denmark, Belgium, Sweden, New Zealand, Brazil and Argentina.

It seems, on the whole, completely logical to examine the possibilities of supplying surplus tools, especially to the medium or smaller moulding companies abroad who, like their counterparts in this country, encounter limits in the commercial life of such moulds.

It is common knowledge in the plastics world that: (1) the best chromium-plated steel moulds are expensive items of capital expenditure; (2) most tools outlive commercial (although not physical) life so far as home markets are concerned; (3) the export of finished mouldings is hampered by trade restrictions, while tools may pass freely across frontiers. It seems, therefore, common sense to seek a means of obtaining the maximum use out of expensive tools. It offers, furthermore, the possibilities of further co-operation, if high-quality tools only are sent and our reputation is thereby enhanced, of increased demands for new tools and also of raw materials.

The idea is not new. There was always a small exchange in Europe in pre-war days and it has been elaborated in the U.S.A. on a royalty basis between that country and South America. The U.S. moulders thus get the benefit of longer returns on their original investment and South American moulders profit from continued local demands.

The new organization, Tool Exchange, Ltd., is set up to extend this practice to European and Commonwealth countries by supplying quality British tools on a royalty basis. The royalty, it is stated, will not affect the price of the finished articles in the European or Commonwealth markets because no sums need be set aside by the recipients for the amortization of the tools. All the tools made available for this exchange service will already have been fully amortized during their effective life on the British market.

The company is able to offer immediately a range of successful stock moulds from a number of well-known British moulding companies and, as the demand from abroad increases, it is hoped that the variety of items and the number of mould suppliers will also increase.

To us this nucleus is promising also for the implications that lay ahead. We are informed that growth may lead to a strong embracing entity of non-profit-making basis. What is perhaps more important, it may at its best, when accompanied by sound advice, create an ascendency of British high-

quality technique for moulding powders, machines, moulds and tools throughout Europe as well as other countries—a consummation devoutly to be wished. It may also have the effect, because of resulting economy, of stimulating and increasing orders for new tools by British firms.

Air Topics

ON September 6 the Society of British Aircraft Manufacturers held their annual meeting at Farnborough and, since this important function takes place while we go to press, readers will have to wait until next month for details of what was on view so far as plastics are concerned.

In general, the main standard applications are the now universal "Perspex" windows, observation domes and radomes, phenolic and urea mouldings and mouldings and extrusions of p.v.c. and polythene for electrical and other parts, small structures, flooring, fitted tables and the like. From the large constructional point of view, much has been done and more is in the experimental stage. It is true we have heard little of the actual application of the cellular structures made from phenolic impregnated paper described two or three years ago by Sir Ben Lockspeiser, which are still under test. On the other hand, "Redux" glues were used extensively in the Comet for bonding metal to metal in the wings and the pressurized fuselage, and "Marco" resins in the icing ducts in the same aircraft. "Nuron" and "Marco" resins are also employed in glass-fibre structures. "Aero-Jablex" is being used in the construction of helicopter blades. A display of research equipment used in the study of axial-flow compressors for gas-turbine engines was interesting in that the research compressors are fabricated largely of wood, "Tufnol," "Perspex" and light alloy, and can be made with fully detailed working drawings.

Constructional techniques for radar equipment displayed in working models showing the advantages and drawbacks of 11 experimental methods, which included the normal chassis; printed systems using (a) normal components; (b) deposited resistors; (c) deposited resistors and polythene capacitors; (d) metal film resistors on glass base; squirrel cage construction in casting resin; miniature construction in casting resin; and encapsulated systems in (a) casting resin; (b) casting resin loaded with alumina; (c) alumina powders; (d) solid light alloy.

Developments seen in the exhibition of aircraft materials and accessories included the first appearance of curved sandwich construction with both honeycomb and skin of resin-impregnated glass fabric (Thermo-Plastics, Ltd.); and a "Perspex"-rubber-metal bonding system for securing pilot cockpit hoods to aircraft (Triplex Safety Glass Co., Ltd.).

Although the new Miles gliders were not on view, much interesting work is being carried out. Mr. F. G. Miles is producing three prototypes. Glass-fibre will be used and so will "Durestos," the phenolic-asbestos felt-like material made by Turner Brothers Asbestos Co., Ltd. After hardening, one type of this material has a tensile strength of 29,000 lb./sq. in. in one direction, very high impact strength and, of course, high heat resistance. The above two materials and a third plastic sheet, whose nature has not yet been disclosed, will form a sandwich construction.

MOULDING POWDER AND SHOT

Mobility in Building

Mr. Singer's series of articles now running in this journal under the general title of "Plastics in Building" will, I am sure, create great interest in both building and plastics industries alike, as much for his descriptions of the potentialities of plastics as for the practical suggestions he makes. I completely forgot, however, to show him something that is happening in these very offices of Temple Press, Ltd., which he might well have used to illustrate one of his recent articles. This is a modern block of buildings built in 1939 and then provided with ample room as we thought for expansion. After the war, with the return of those who had been in the Services, and with the increase in the number of journals published and therefore in printing plant, increase in the photographic, art and mechanical drawing departments, to say nothing of managerial and ancillary sections, crowding was evident. With additional building so restricted, what is virtually a re-shaping of offices began a year or so ago by the use of "Holoplast," the hollow "girder"-formed phenolic laminate in 8-ft. by 4-ft. sections. The walls are, in fact, "movable," and a wide range of office shapes are thus possible and changeable so that the greatest efficiency can be arrived at. To date, some six or eight offices have been constructed and this work continues. The photograph shows one now in course of construction, each section being beaded with extruded aluminium.

* * *

Revolt in the Dessert

If the writer of "Seeing Through It," in the August issue of this journal, had waited a few weeks he might have had a good word to say of the Minister of Transport, instead of brutally accusing the Government in general, and the British Railways in particular, of having no concern in promoting clean food. Indeed, if he had hopped round Liverpool Street Station last month, as I did, to partake of tea, and a rock-cake, he would have noted a singularly welcome and colourful change in the habits and methods of the haughty dispenser of sustenance behind the buffet counter. The tea is still sergeant-major's, and the rock-cake had increased slightly in Brinell hardness to 21 since I last saw it, but Madame la Marquise is no longer dressed in off-white. She wears a delicate mid-green apron (I hope the printer doesn't put mud-green) and, stap-me-vitals if it isn't true, green rubber gloves! The particular rock-cake she handed me was not protected from the attentions of a fly or two on that hot August day, but at least she did put it on a plate with a pair of plastic tongs. "O fat white lady whom nobody loves, why do you shatter us with green rubber gloves?" as Mrs. Frances Cornford might have said. And, blow-me-down if, the next day, the Ministry of Food didn't announce in the papers that it is sponsoring a coloured film dealing with the fly and the need for protecting food. Revolution, gentlemen, has come to Great Britain. Up the plastic food-covers! Up the laminates for shelves and table-tops!

DOGSBODDY.

These three polythene bottles have been coated with precious metals. (Left) Silver, matt surface. (Centre) Silver, bright. (Right) Gold, bright.

Gilding the Lily?

THE July issue of this journal contained a note referring to the opinion held by some that the plastic bottle of polythene suffers from the fact that it possesses a waxy feel. We have never considered this as a special disadvantage; it is not greasy, and to us what might be called the granular feel is rather pleasant to the touch. What is perhaps more important, some of the bottles do not possess it. For example, the excellent large type made by E. Shipton and Co., Ltd., for technical purposes generally, and which we exhibited on our B.I.F. stand this year, is polished, smooth and devoid of it. This may be due to production methods or to the quality of the mould, but there is a considerable difference.

Whatever the opinion, however, there does seem a desire to obtain a change in the feel and, as we have already noted, a British patent deals with the application of an outer skin, e.g., regenerated cellulose, presumably to give both greater heat resistance and the aforesaid change.

It was therefore of special interest to hear from the directors of Metaplast (England), Ltd., that this subject has also been considered by them, that they had in fact produced metal coatings on polythene bottles, and that they would like our opinion as to the possible uses that could be made of them. Readers will remember our visit to this company's factory at Harmondsworth, Middlesex, and the description we published in our October, 1949, issue of their new, continuous electroplating process—the first, we believe, in this country; here an extremely wide range of metallic depositions in many colours is produced on plastic buttons, dress decorations, and the like.

We were considerably intrigued with the new idea and, during the short journey, pondered on metallization and wondered rather what we should find at the factory. The only bottles of metal of which we have experience (others, such as Egyptian silver and gold bottles, and, we believe, Roman glass bottles protected with metal casings, are known to antiquaries) are the cyclist's aluminium bottle, the perfume bottle, and the cumbersome lead ones that on occasion were seen in the old days for the strictly utilitarian purpose of holding hydrofluoric acid.

Judge our astonishment and pleasure at being presented on our arrival with three prototype silver and gold bottles, that is of polythene, coated with these two precious metals. One is of polished gold, the remaining two of polished and unpolished silver. While the coatings of the metals are thin, and the neck of polythene remains uncovered, one receives the inverse impression that the bottles are not of polythene but of solid gold or silver, with a plastic neck. This is enhanced by the complete change from a soft bottle to a hard one—the metal coatings (a preliminary copper film plus the overlaying precious metal) have resulted in a total thickness giving complete stiffness and hardness. The new bottles are only slightly heavier than the original, but it is also essential to note that like the original they are completely unbreakable, that is the metal coating itself is unbreakable.

What will be their sphere of application? It is clear that they cannot be used as powder or liquid spraying bottles, which function because of softness and resilience. But obviously there must be legitimate fields for such productions when softness is a deterrent, and hardness is an advantage. For richness, or rich simplicity and beauty, it would be difficult to improve on them.

The first application that leaps obviously to the mind of the ordinary observer is the luxury field of the fitted suitcase, the lady's travel bag for " make up " and the dressing table. Our imagination is not so fertile as to see beyond at the moment—but beautiful, " rich " and unbreakable, surely the world wants such bottles.

As is our usual practice when dealing with this field, we hastened to show the bottles to our friendly neighbour, John S. Waterer, F.S.I.A., the famous designer of high-class travel goods in leather and plastics. His reaction was immediate and responsive, and he has promised to give us his views.

The general process of electroplating plastics also invokes the idea of coating cups, saucers and plates. One is averse to gilding the lily, but at least there would be less worry in the plastics industry about resistance to high temperature and to the effect of washing soda, soaps and other detergents. Perhaps one ideal in front of us, so far as decorations in this field is concerned, is the possibility of plating engraved or moulded designs. Obviously, this would entail "stopping off "—not a simple matter.

Containers for Air Transport

By G. MAY

WEIGHT-SAVING requirements in building aircraft have been largely responsible for the rapid development of low-density sandwich constructions. This can be readily appreciated when it is realized that every ounce saved in the construction of aircraft is calculated to result in an economic advantage of £1 per annum on working costs.

Steady increase in air travel is paralleled by the growing popularity of transporting goods by air-freight; most particularly when there are benefits to be obtained by taking advantage of the time factor. In this respect, it is most important that careful consideration should be given to packaging materials by applying the same weight-saving formula already established in aircraft manufacture.

There are many instances of packing cases being actually heavier than the products they contain. This is a most decided economical disadvantage as far as transport by air is concerned, but it should also be remembered that a case must be sufficiently strong to protect the contents against all travel risks.

Conscious of the ever-growing demand for the use of air-freight services, and in order to encourage packing case manufacturers to produce containers most suitable to meet their requirements, a contest was sponsored recently by the French air line, Air France.

There is no doubt that in such a competition the industrialist enters in the same spirit as does his counterpart in the field of sport, and for all competitors there exists the exhilarating enthusiasm of pursuing the prize. This reasoning is confirmed by the Air France contest attracting prototype packing cases from no fewer than 240 entrants.

In order to decide which entry was considered most suitable for airborne packing, the judging committee included inspectors from air-freight companies, together with those of shipping lines and representatives of railways experienced in matters concerning the movement of freight.

After thorough examination and testing, the first prize was awarded to Société Ossau-Béarn, of 123 Avenue des Champs-Elysées, Paris, for their "Kraft-alu-France" collapsible packing case, which was considered to have the highest strength/weight ratio and also to be the most advantageous in design.

The prize-winning container consists of six rigid, lightweight sections, which are assembled in sequence by an arrangement

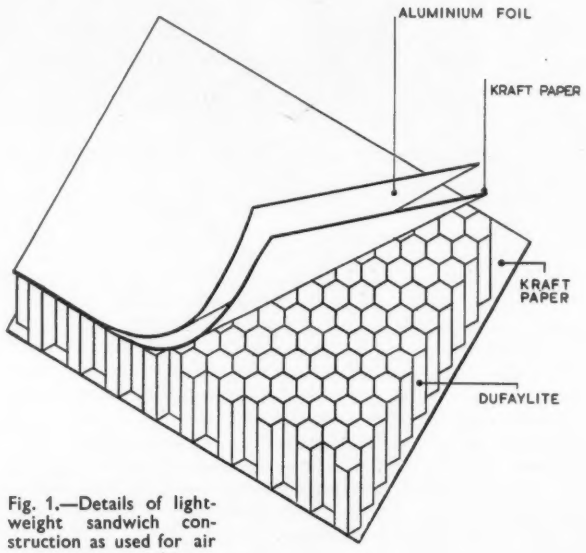


Fig. 1.—Details of lightweight sandwich construction as used for air transport container.

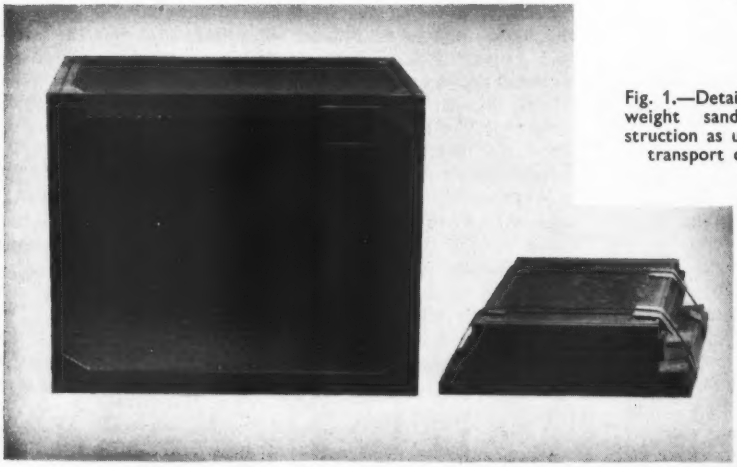


Fig. 2 (above).—The prize-winning container, and sections for this container packed flat.

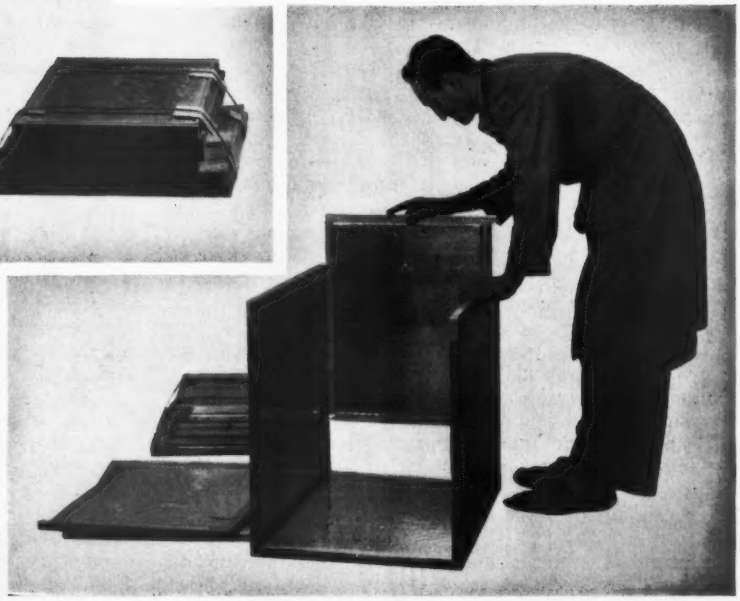


Fig. 3 (right).—The panels are quickly assembled, in sequence, without the use of tools.

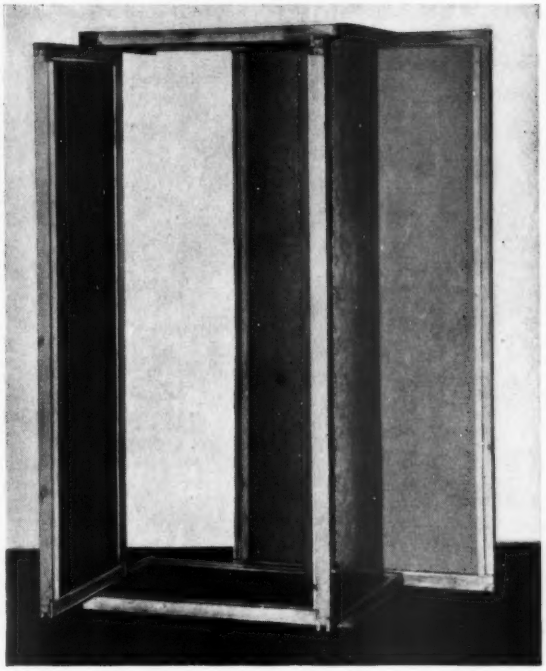


Fig. 4.—Panels in position, before complete assembly.

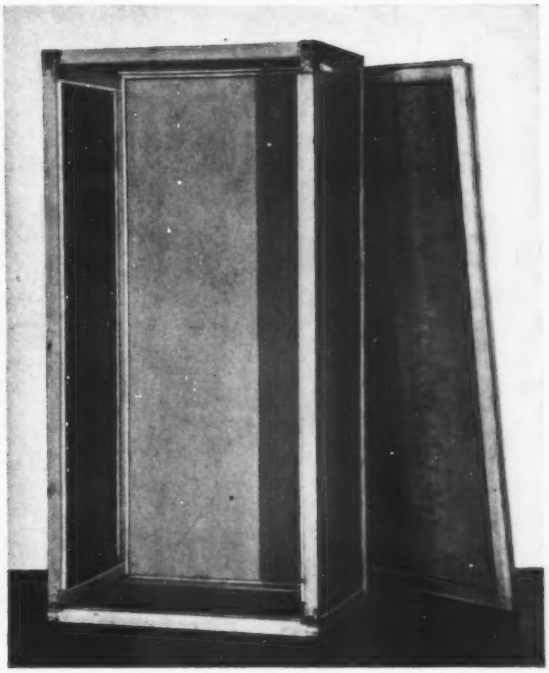


Fig. 5.—The container, ready for use, with lid separate.

of tongue and groove interlocking incorporated into the panel framework. The packed case is secured by a single bolt, with a lead seal for impressing with the sender's trade mark. No tools, screws, or adjustments are necessary to assemble or to dismantle.

Lightweight construction is based on the use of " Dufaylite " resinated paper honeycomb core, now manufactured in France under licence. This core is laminated between two sheets of kraft paper to give an overall thickness of 20 mm. For weather protection, the outer skin has a sheet of thin aluminium laminated to the outer surface, a treatment which may also be applied to the inner skin if preferred. Added strength and shock resistance are obtained by aluminium-alloy angle pieces, riveted to the framework at the panel corners. Thought has also been given to the address label, a metal frame being provided on the front panel to accommodate this.

The main feature of the " Kraft-alu-France " container is, of course, the weight-saving factor of 70 per cent., this being appreciated by reference to the comparisons given below:—

Capacity	Weight of Case made from 15 mm. Pinewood	Weight of "Kraft-alu" Containers	Saving in Weight	Proportional Gain
	kg.	kg.	kg.	
50 litres	11.20	3.30	7.90	
100 litres	14.80	4.40	10.40	70%
150 litres	16.65	5.00	11.65	
225 litres	20.10	6.00	14.10	

Saving of weight as indicated above means that the cost of a container is largely recoverable on a normal single journey and as much as three times over on proportionately longer distances.

Other advantages acknowledged by air-freight companies are that the newly developed cases have no flanges or projections to make stacking difficult or to impose on valuable space. After dismantling, the flat pack allows for return empty at minimum cost.

Careful study of materials best suited to the purpose have resulted in the adoption of cellular sandwich construction, to permit the carriage of both heavy products and fragile goods under the best conditions of security with metallic covering to give protection against rain or snow while exposed in the process of handling between storage and transport.

By standardizing on two sizes of base panel with three sizes in height, the manufacturers have provided for possible combinations giving six different variations:—

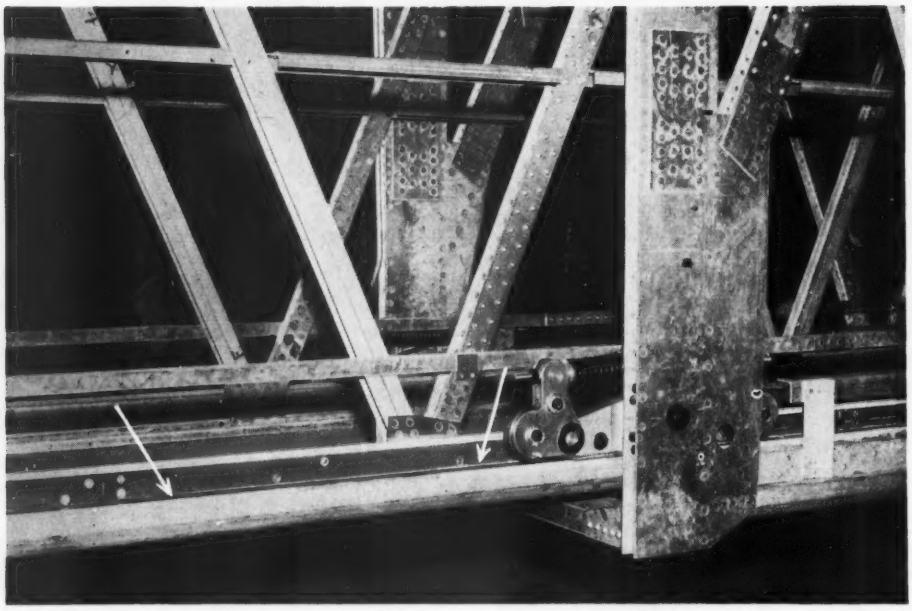
Base	Height	Capacity	Weight
	mm.	litres	kg.
500 mm. × 500 mm.	200	50	3.50
	400	100	4.40
	600	150	5.00
750 mm. × 500 mm.	200	75	4.00
	400	150	5.00
	600	225	6.00

Patent applications covering the manufacture of the " Kraft-alu-France " container have been registered by Société Ossau-Béarn, and this company, encouraged by their success in producing a packing case weighing only 30 per cent. of a similar case in wood, are now developing cabin trunks on a similar lightweight principle.

Plastics Research at the N.P.L.

THE report of the National Physical Laboratory for the year 1948, just published by H.M. Stationery Office (price 1s. 9d.), mentions research undertaken in collaboration with the Chemical Research Laboratory on resin-bonded fabric laminates. The research programme concentrated on determining the differences in mechanical properties of phenol-formaldehyde boards made with fabric in the loomstate, in the de-sized and in the de-sized and scoured states, paper reinforced boards being used as control. Tests were made using resin contents of 13, 26 and 33 per cent.

A preliminary series of paper and scoured fabric reinforced boards have been tested to determine the effects of curing time and temperature, drying time and temperature, volatile content, and age of resin solution on the mechanical properties of the boards. Work has also been in progress to determine the variation of shear strength through the thickness in thick boards, and in correlating delamination results with shear strength and cross-tensile strength.



Close-up view of part of gangway structure, with "Delaron" strip indicated by arrows.

Laminate Reduces Friction on a Dock Gangway

PASSENGERS using the telescopic gangway which will link the new Ocean Terminal with "Queen" vessels of the Cunard White Star Line at Southampton Docks, will be interested to learn that a small engineering application of phenolic fabric-base laminate has made this telescopic gangway a workable proposition.

The new three-storeyed Ocean Terminal building is over 1,200 ft. long and, apart from boat-train platforms, it includes all necessary facilities, such as Customs halls, writing rooms, buffets, information kiosks, lifts, escalators and sightseers' gallery, all under one roof. The normal type of gangway, which would need to be lifted into position by crane, however, has been replaced by one which can be extended mechanically to join the first floor of the terminal building and the ship, and thus provide fully enclosed walkways for the comfort and convenience of travellers. One reason for the change was that the old-type gangway was not wholly suitable, particularly during high winds.

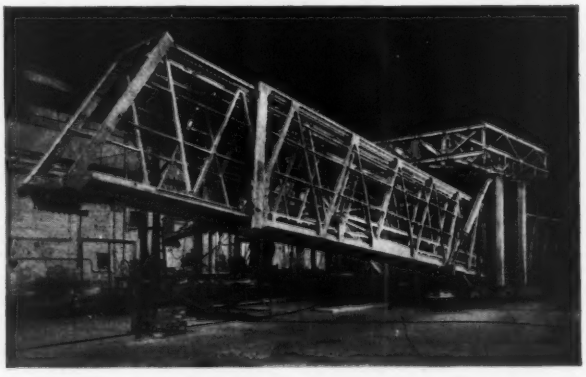
Three complete gangway units are being installed, each consisting of a shore station with two walkways (one for ingoing, the other for outgoing traffic) which can be slewed, luffed, extended and telescoped as needed.

Aluminium alloy was chosen as the main constructional material in order to minimize the load, and also to reduce the size of the operating mechanism, which threatened to make the whole structure unwieldy. The specification called for a load of 200 lb. per ft. of walkway and for wind loading up to 50 m.p.h. winds. As the extended end of the walkways cantilever 75 ft. clear of the outer supporting rail, considerable forces have to be taken by the mounting turrets, the shore structure and the operating gear.

The intended telescopic motion brought in its special problems. The chains, which are disposed in each side of the gangway walls, incorporate a Lockheed hydraulic compensating mechanism to ensure a balanced pull.

To reduce local stresses at the points of contact between the fixed and extending part of the gangway, there is a pair of spring-loaded wheels which run on a strip of fabric-base "Delaron," the springs being loaded to a predetermined figure. As the loads applied by these wheels would become excessive when the gangway is fully extended and loaded to the design specification with passenger traffic, at this point the springs allow the wheels to withdraw and pressure pads share the load. It was on account of its low friction coefficient that plastics was chosen to provide the smoothest possible telescoping motion.

One of our illustrations shows part of the telescopic structure, with the "Delaron" strip indicated by arrows. The gangways have been constructed by Structural and Mechanical Development Engineers, Ltd., Slough, Bucks. "Delaron" is a product of Thomas De La Rue and Co., Ltd., Plastics Division.



Inner and outer sections of telescopic gangway showing construction before sheeting the sides; part of shore station seen on right.

The Paris Fair

MOST of the industrial fairs of the world appear to be held in the spring or early summer. This very excellent procedure, however, has certain drawbacks for the technical journals desirous of reporting on them: since we must concentrate on our own B.I.F. it is difficult to allow additional space to those that are held abroad. Thus the following notes of the Paris Fair, which was held May 13-29, have been withheld until now.

Founded in 1904, this Fair was originally a toy fair only, of very small dimensions. It is now a very large one held at the Porte de Versailles just outside the south-western walls of Old Paris, and every industry is represented.

This year there was a special Plastics Section, but it is to be regretted that it was scarcely representative of French plastics production. A hard-bitten French technologist has given us the opinion that there is no real French plastics industry. This cynical criticism obviously does not refer so much to production of raw materials, which, although very much smaller than production in Great Britain, is, in fact, of high quality, but rather to the very tenuous links between manufacturers and the absence of a strong central body such as the British Plastics Federation. Furthermore, there is little doubt that while the French nation is very much alive in many respects to the scientific and industrial possibilities of plastic materials, the economic structure of the country coupled with financial stringency prevents the large-scale development of fields that are so common here, namely, in industrial applications.

There are, of course, other particular reasons why the industry is small: over-development of the few natural resources, such as wood and aluminium, no abundance of coal, the fact that France is much more an agricultural organization than an industrial one, and that its other great industries are those of wine-making, haute-couture and its allies, such as perfumes, cheese production, and so on. Heavy and light engineering there is, and whether building motor cars or bridges, dynamos or dams for water power, the French can make them probably as well as most—but the size of such industries is not great.

All this seemed reflected in the Paris Fair. First and foremost, as we have said, it was not representative, and the only famous name we saw was that of Alsthom, who make "Plexiglas"—the French opposite number to our "Perspex." Why this was so, we do not know, but we were disappointed not to see representatives from the towns of Oyannax and Lyons, where the great French plastics industry may be said to be centred, nor from the great firms of Rhône-Poulenc, Kuhlmann, Bakelite, St. Gobain, Péchiney, to say nothing of well-known moulding concerns such as Nobel Francaise, M.I.O.M., Fibre Diamant, Baldon, Boutet, Collet, Isolants Modernes, Isolants-Réunis, Hemmen et Jacquemin, and others.

Extrusion machine for producing soft and hard tubes and rods with plasticized or unplasticized raw material, exhibited by Trudex, Paris.

It was no surprise, therefore, to get the false impression from the stands, of which there were some 70, that the greater part of the French plastics industry was built up on p.v.c. and its transformation into raincoats, babies' knickers, and blown-up forms of seaside entertainment, and on acetate for toys and sun-glasses. But while this is somewhat out of proportion to the real state of affairs, it is not a gross exaggeration. It is astounding to find that some 2,000 firms are listed in the French plastics annual, and that by far the larger proportion of these are small moulders and fabricators devoting their energies to making combs, toys, buttons and a thousand-and-one gadgets varying from dress ornaments to flower-holders and powder-boxes to sun-glasses. However, we do not wish to infer that the fancy goods industries are unimportant. Far from it, for the markets are stupendous. It is simply that, to an Englishman, the balance of plastic production seems lopsided.

To give a curious enough insight of this exhibition we may mention that we did not see one plastic lavatory-seat. This

(Above) R. H. Windsor Ltd., London, show their S.H. 6/8 injection moulding machine.

(Left) Laroche Frères, Paris, exhibit a 12-ft.-diameter bathing pool, and boat and toys, all inflated, made from H.F. welded p.v.c.

Plastic tables at the Colisée (left) and the Marignan (right) in the Champs Elysées, Paris.

adjunct to modern life which, in Great Britain, is regarded quite rightly as an industrial moulding of exceptional importance, covered by a B.S. specification and accepted by the British building industry with enthusiasm, must be a rare object in France. This would appear to be borne out by a rapid visit to the adjacent section of Sanitary Ware, in which were exposed hundreds of these objects in wood—none that we could see were of plastics. And the wooden ones were pretty poor things, too!

Taken all in all, we should say that the French plastics industry is predominantly an injection moulding industry, and mostly devoted to the "lighter" productions, a direct descendant of the great nitrocellulose and casein industries which made itself felt throughout the world during the 30 years prior to the late war. On the other hand, a real assessment cannot be obtained from the Paris Fair. A better analysis would be seen at the more concentrated fair at Lyons.

It was certainly gratifying to see the stand of our own R. H. Windsor, Ltd., who worked their S.H. 6/8 oz. injection machine. From what we have said above, there is little wonder that this company found business very good indeed.

Finally we may note that it was outside the Fair that we saw one of the most important applications of plastics that the French have accepted with enthusiasm—the moulded and laminated table top. And what a market there is for it! There is no need to tell the reader that Paris cafés are infinitely more numerous than British pubs, and that each French café possesses a minimum of about a dozen small tables. Wooden and marble tops have gone—plastics hold the field for obvious reasons.

We produce two photographs of the famous Colisée and the Marignan, exactly opposite one another in the Champs Elysées. We counted more than 150 tables in each of them, all moulded or laminated!

BOOK REVIEWS

"Silicones and Other Organic Silicon Compounds." By H. W. Post; pp. 230. London: Chapman and Hall, Ltd. 30s.

It is now over 25 years ago that an organic liquid containing silicon was placed on the market in Great Britain. Known as silicon ester, it was used as a protective material for structural stone and as a basis for special paints and was manufactured by Albright and Wilson, Ltd. This interesting production, however, bears little relation to the modern polymer industry based on silicon that has arisen during the short space of 10 years. Interest in the replacement of the silicon atom for carbon in many organic compounds has grown greatly, and the present book by Professor Post, of the Department of Chemistry in the University of Buffalo, is an invaluable correlation of the great mass of material relating to the silicone resins and other aspects of the organic chemistry of silicon

Our special interest to-day in these compounds lies in the fact that the polymers containing silicon have become of outstanding importance as impregnating materials, varnishes, etc., and possess such heat-resisting properties that electrical insulation has been greatly improved. Other silicon polymers have the special property of retaining fluidity at very low temperatures or, again, are highly water repellent. Paper, for example, may be treated, retaining its ability to absorb water and yet not disintegrate.

The book contains 10 chapters, among which are discussed the work of Professor Kipping, of Nottingham University, to whom the author makes a fine tribute; the preparation of organic compounds of silicon at varying temperatures and the patent literature referring to this subject; the uses of polymerized oxysilanes, silico-organic compounds analogous to ethers and amines; nomenclature and physical properties of about 800 silico-organic compounds. There is also an excellent bibliography of the whole subject.

"Phenolic Resins: Their Chemistry and Technology." By P. Robitschek and A. Lewin. pp. 261. London: Iliffe and Sons, Ltd. 30s. net.

It is common knowledge that while the gap between theory and practice of resin production and of the technique of using plastic materials has grown smaller in recent years, the need for linking the two aspects of the industry is more important than ever. As the book cover states, the authors' purpose is to integrate theoretical knowledge and industrial practice, a purpose which is quite adequately fulfilled.

This treatment can be noted throughout even in the "theoretical" chapters on "Chemistry," "Physics" and "Kinetics." Thus in the first named, following the general chemical theory of the formation of phenolic resins with acid and alkaline catalysts, the authors proceed in the same chapter to discuss the structure of technical resins: for moulding powders, for laminates, for casting and for varnishes and paint. Likewise, the admirable little chapter on kinetics is simple enough for most and deals with the simple phenol-formaldehyde system so far as turbidity-time and viscosity-time relations are concerned and with velocity of reactions with alkaline and acid catalysts, etc. Each of these three chapters is concluded by a simple useful summary.

The foregoing is therefore a useful basis the authors employ to complete the

(*Continued on page* 244)

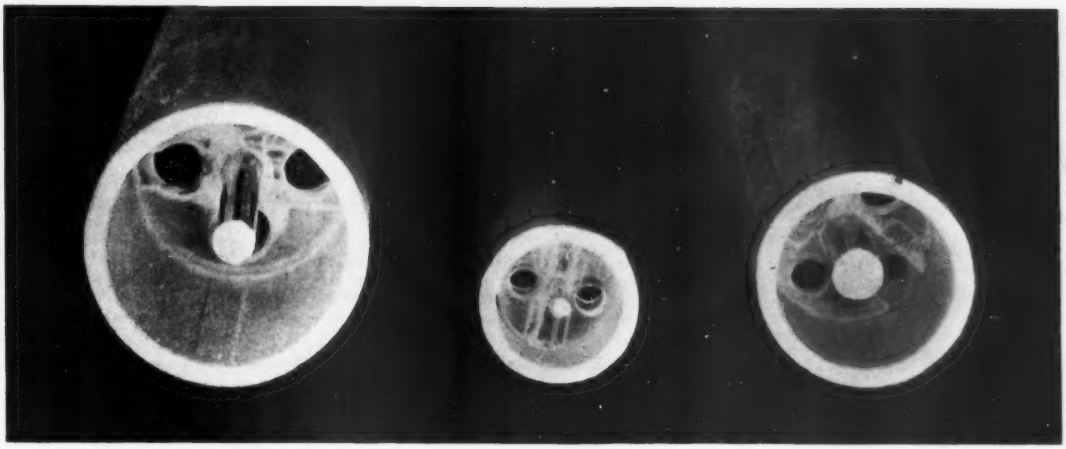


Fig. 1.—Disc-type polystyrene insulated co-axial cable with aluminium sheath and centre conductor of copper.

Polystyrene and Polythene in Electrical Cable Developments

IT was one hundred years ago, to be precise on August 28, 1950, that direct telegraph communication with the Continent became an accomplished fact, following the laying of the first undersea cable between Dover and Calais. This cable was made by the Gutta Percha Co., forerunner of The Telegraph Construction and Maintenance Co., Ltd., Telcon Works, Greenwich. From that simple copper conductor covered with gutta-percha, which linked France and England a century ago, there ultimately developed the air-spaced co-axial cable, which, as laid between England and Belgium, is to-day capable of taking 240 telephone conversations simultaneously.

Notable developments in the general design of co-axial cables have now been brought to our notice by The Telegraph Construction and Maintenance Co., Ltd., who are using both polystyrene and polythene as insulation in combination with an aluminium sheath.

Polystyrene Discs for Air Spacing

One of these new cables is air-spaced with disc-type insulation (Fig. 1) and is intended for high-frequency transmission over considerable distances and as aerial feeders for high- and medium-power transmitters. The effective dielectric constant of this cable, which embodies the maximum air space consistent with mechanical stability, is less than 1.1 and the power factor less than 0.0002. These excellent characteristics are obtained by the use of polystyrene separating discs of patented design, the inner conductor being a solid copper wire and the outer conductor a seamless tube of aluminium, which also seals the cable against ingress of moisture.

The aluminium outer conductor reduces the attenuation by some 25 per cent. over the lead-sheathed counter-parts formerly used; at the same time, due to the extra mechanical strength and reduced weight of aluminium, these cables may be laid directly in the ground or up masts, unarmoured, and with only the normal corrosion-protective outer servings.

Table I gives electrical and mechanical data for the polystyrene disc insulated co-axial cable here described. The use of this type of cable at ultra high frequencies is limited by the reflection phenomena associated with the periodicity of the insulating discs; for high-power low-frequency transmission it may be limited by voltages arising under normal or accidental conditions. A comprehensive range of waterproofed joints and terminations is available, and fitting is purely mechanical as no sweating or soldering to the aluminium sheath is necessary.

Helical-type Polythene Insulation

A second development by The Telegraph Construction and Maintenance Co., Ltd., concerns the production of helical membrane cable (Fig. 2), designed primarily for radio-frequency applications to provide a highly efficient construction which would not have the same frequency limitations as disc-spaced cables. Here the insulation comprises a thin "Telcothene" (polythene) tape, which is lapped edge-on around the inner conductor, with an aluminium sheath drawn down over all.

A method of achieving this basic form of insulation has been sought unsuccessfully for many years. In the practical form which has been realized, the

Table 1.—Characteristics and nominal dimensions of aluminium-sheathed air-spaced, disc-type polystyrene insulated co-axial cable.

Code Number	A.S.26.Al.	A.S.57.Al.	A.S.33.Al.
Nominal characteristic impedance, ohms.	100	75	100
Approximate overall size (served cable), inches	1⅛	1	¾
Electrical Data			
Characteristic impedance, ohms.	95-105	70-80	95-105
Capacity, $\mu\mu$ Farads/ft.	10.5	14.5	10.5
Attenuation, db/100 ft.:			
1 Mc/s.	0.045	0.055	0.085
10 Mc/s.	0.135	0.175	0.265
100 Mc/s.	0.465	0.585	0.875
600 Mc/s.	1.35	1.65	2.34
Power rating (kW. in air):			
1 Mc/s.	17	14.5	7.5
10 Mc/s.	6.3	4.5	3.9
100 Mc/s.	1.8	1.4	0.8
Maximum R.F. voltage peak, kV.	5	3	2.5
Mechanical Data			
Diameter in inches:			
Over copper conductor	0.128	0.155	0.064
Over aluminium sheath	0.87	0.66	0.455
Minimum bending radius for installation, inches	13.0	10.0	7.0
Weight, lb./1,000 yards:			
Aluminium-sheathed cable only	705	605	235
Cable and servings	1,355	1,115	615
Tensile strength, lb. (conductor)	460	680	115

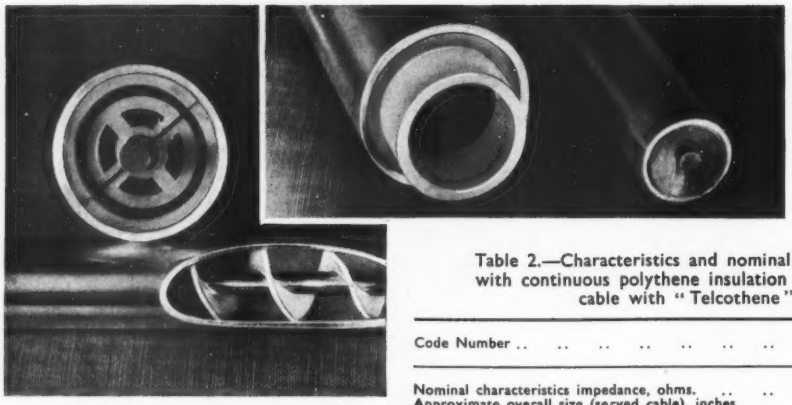


Fig. 2 (above).—Continuous tape polythene insulated co-axial cable with aluminium sheath.

Fig. 3 (left).—In this new "Telcon" cable the insulation is provided by a series of interlocking semi-cylindrical thimbles moulded in "Telcothene"

Table 2.—Characteristics and nominal dimensions of helical membrane cables with continuous polythene insulation (H.M.4.Al and H.M.6.Al) and "Telcon" cable with "Telcothene" thimble insulation (A.S.84.Al).

Code Number	H.M.4.Al.	H.M.6.Al.	A.S.84.Al.
Nominal characteristics impedance, ohms.	75	75	85
Approximate overall size (served cable), inches	1	¾	1⅛
Electrical Data			
Characteristic impedance, ohms.	73-77	73-77	83-87
Capacitance, $\mu\mu$ Farads/ft.	14.3	14.3	14.0
Attenuation, db/100 ft.:			
1 Mc/s.	0.046	0.0716	0.026
10 Mc/s.	0.147	0.228	0.085
100 Mc/s.	0.486	0.742	0.32
600 Mc/s.	—	—	1.0
1,000 Mc/s.	1.73	2.54	—
3,000 Mc/s.	3.37	4.77	—
Power rating (kW in air):			
1 Mc/s.	14.0	7.5	39.5
10 Mc/s.	4.3	2.3	11.5
100 Mc/s.	1.4	0.72	3.2
1,000 Mc/s.	0.4	0.21	—
Maximum R.F. voltage, kV (peak)	2.2	1.3	—
Mechanical Data			
Diameter in inches:			
Over copper conductor	0.170	0.111	0.260
Over aluminium sheath	0.735	0.470	1.400
Minimum bending radius for installation, inches	11	7	21
Weight, lb./100 yards:			
Aluminium-sheathed cable only	700	290	240
Cable and servings	1,255	675	330
Tensile strength, lb. (conductor)	1,185	480	1,900

effective permittivity is as low as that of any commercial form of disc-spaced cable, and preliminary tests indicate that an extremely high degree of uniformity has been achieved. In combination with an aluminium sheath as outer conductor and as watertight covering, this type of cable has electrical characteristics which closely approach the optimum and is mechanically extremely robust.

Air Spacing with Thimbles

To meet the requirements of a low-loss feeder having a very high degree of uniformity there has been developed a new cable ("Telcon" A.S.84.A1) in which the realized mean value of reflection coefficient is less than 0.5 per cent. when tested on a 100-ft. length of cable over a 10 per cent. bandspread at 200 Mc/s. This cable is intended primarily for use as a television antennæ feeder.

Employing a single copper wire as the inner conductor, the insulation for this cable (Fig. 3) is formed by a series of interlocking semi-cylindrical thimbles, which are accurately moulded in "Telcothene" of low dielectric loss. The outer conductor, as before, is formed by a seamless extruded tube of high-conductivity aluminium, which provides a highly efficient return and at the same time serves as a watertight sheath to protect the semi-air-spaced insulation. Robustness and light weight permit installation on masts without the usual steel armour. In manufacture, the insulation thimbles are located around the copper conductor prior to application of the aluminium sheath.

BOOK REVIEWS

(*Continued from page 242*)

work: resin production in the laboratory and on a large scale; moulding compositions; casting resins; laminates; pulp-resin preforms; resin-wood products, and moulding. Further chapters deal with testing physical, chemical and electrical properties and with applications.

The reviewer thoroughly enjoyed reading this excellent little book, except at one or two points. On page 34 the authors, after writing the word hexamethylene tetramine, evidently got tired, began substituting hexamine, and then horrors, the word "hexa" throughout! Hexamine is permissible, but surely never "hexa." Six of one may not always be six of the other. Nor should the word "formalin" (page 64) intrude in a scientific treatise, and in any case it is rarely, if ever, used in industry. However, these solecisms do not spoil the book.

"Packaging and Display Encyclopædia, 1950," London: George Newnes, Ltd. 63s.

This is a remarkable and praiseworthy achievement, not only because it is excellently printed and stoutly bound as a big encyclopædia should be printed and bound, but because it provides exactly and (so far as we can see) completely what the user of packaging and display work wishes to know. To our delight, it contains no reference to the manufacture of the raw materials—in which the user is almost entirely uninterested.

The titles of the chapters show how well this book has been compiled: survey of packaging in industry; packaging for export; design in the packaging and display industries; display methods and materials; exhibitions and trade shows; metal containers, collapsible tubes and closures; fibreboard cases and cartons; wrappings and liners; surface decoration; shock-proof packaging; sealing and adhesives; plastics in packaging and display; manufacturing equipment; mechanical handling; insurance, transport and dispatch, etc. The plastics section gives a good insight as to the growth of our industry in this field, although we note that no mention is made of the polythene bottle.

"France-Plastiques." Published by Société C.E.P.P., 8, Rue St. Lazare, Paris. 1,380 francs.

This is the second edition of a very complete catalogue, under the patronage of two large associations of the French plastics industry. Devoid of unnecessary elaboration and well printed, it is what it purports to be: a catalogue of apparently all the moulders and fabricators in France, of moulding powder and raw material manufacturers and importers, and of makers of all plant connected therewith. In addition there are sections relating to the types of mouldings and fabrications made, in alphabetical order. An interesting addition is the classification of moulders, etc., by geographical situation.

World's Industry Employs Plastics

ELECTRICAL

Electrical precision measurements of plastics.—T. Gast reviews the methods for determining capacity, dielectric loss factor, and dielectric resistance. The values to be determined are recorded in relation to time or temperature. ("Kunststoffe," 1950/Apr./121.)

Thermoplastic insulation for wire and cable.—J. E. Flood discusses the merits of the various thermoplastics which have been suggested for insulating purposes: polyvinyl chloride, polyethylene and nylon, dealing also with their manufacturing problems. ("Wire and Wire Products," 1950/May/401.)

New vinyl resin for cables.—A new resin, "Marvinol VR-20," is said to be easy in processing and specially recommendable for the insulation of electric wires and cables; in particular, the processing temperature can be lowered. ("Wire and Wire Products," 1950/May/441.)

Moulded commutators are robust and dimensionally strong and can run at high speeds; faults, such as bar-lifting and insulation faults, are practically avoided. A detailed description of the production processes, as carried out at Hoover, Ltd., Perivale, Middlesex, are given. ("Machinery" (London), 1950/July 13/39.)

Welding of plastic foils.—A survey of the relationship between thickness of foil, welding time, welding capacity and efficiency in the high-frequency welding of plastics has been made. ("Elektrotechn. Zeits." (Wuppertal), 1950/No. 4/79.)

MISCELLANEOUS

New Tough Plastic, "Enrup," seems to bridge the gap between soft and hard rubber; it is light in weight and very stable at high temperatures. It is particularly suited for washing machine parts, as it is very resistant to the newer detergents. ("Automotive Industries," 1950/June 15/70.)

A scratch tester for Plastics has been developed by Taber Instrument Corp., North Tonawanda, N.Y. A diamond scratch point rests on the specimen. A sliding weight is moved away, along a scale beam, and a cut is made by turning the specimen by hand slowly in anti-clockwise direction. ("Materials and Methods," 1950/June/112.)

Plastics in refrigerators are reviewed in a general survey. ("Air Condit. Refrig. News" (Detroit), 1949/No. 16/15.)

French polyvinyl chloride fibres.—A survey on properties and uses of the French synthetic fibres Rhovyl, Febrovyl, Thermovyl and Isovyl has been given. ("Textile World" (New York), 1950/No. 4/120; "Brit. Rayon Silk Journ" (London), 1950/No. 310/63.)

Floor coverings of polyvinyl chloride and rubber are dealt with by W. Triebel. It is stressed in particular that these floor coverings are warm to the feet and relatively inexpensive. ("Neue Bauwelt" (Berlin-Wiesbaden), 1950/No. 6/90.)

Plastics in the house.—H. Saechtling compares moulded plastics and laminated materials with inorganic material, with reference to service and costs. ("Neue Bauwelt" (Berlin - Wiesbaden), 1950/No. 3/37.)

A new highly flexible material, "Valcollan," is described by O. Bayer. Production methods, properties and manufacture are dealt with. ("Angew. Chemie.," 1950/No. 3/51.)

Nylon ropes.—The application of this high-tensile material in the fishing industry is dealt with by G. Klust. ("Deutsche Seiler Zeitung" (Ulm/Donau), 1950/No. 2/5.)

Plastics in building.—The potentialities of plastics in building have been evaluated by A. G. H. Dietz in an illustrated article. ("Architectural Record" (New York), 1950/No. 3/132.)

Vacuum Cleaner.—Plastics enhance the styling on a new model of a Hoover vacuum cleaner, according to the design of Henri Dreyfus. The motor hood is of dark blue thermoplastic, with furniture guard, handle grip, wheels, attachments, etc., of "Vinylite" and other plastics. ("Machine Design," 1950/May/108.)

Loom bobbins are produced from cellulose acetate and propionate by injection moulding. After moulding, metal rings are pressed on the outside of the butt of the bobbin and a metal insert is placed in the bore. ("Materials and Methods," 1950/May/78.)

Annealing polystyrene to obtain best physical properties is a process developed by Koppers and Co. Inc. Heating in air or water for about 2 hrs. at 160 to 170 degrees F. will relieve the stresses produced during moulding or extrusion. ("Materials and Methods," 1950/May/138.)

New methods for testing artificial leather, described by A. A. Vavilov and V. V. Matveer, were developed in the central research laboratory for the artificial leather industry. (Legk. Promysl, Moskow, 1949/Vol. 9, No. 3/p. 23.)

The properties of lacquer-type cellulose acetate butyrates have been discussed by J. C. Malm and H. L. Smith, and it is shown that they are particularly useful for protection purposes. ("Ind. Eng. Chemistry," 1949/Oct./2325.)

Evaluation of natural and synthetic rubbers.—A. T. Werkenthin reports on additional developments in testing procedures for evaluating of natural and synthetic rubbers and plastic elastomers, describing newest testing methods developed in the Bureau of Ships, Navy Department, since 1946. ("Rubber Age" (N.Y.), 1949/Nov. 1/45.)

Polyethylene.—A Schwarz reviews the production of high molecular ethylene polymers and credits British scientists with the development of the technical production methods. The properties and applications are discussed. ("Kunststoffe," 1950/Jan./13.)

Problems in the curing of plastics.—S. Wintergast investigates the problems when heating plastics in the mould by both heat conduction and high frequency. The latter permits considerable reduction in curing time. ("Kunststoffe," 1950/Mar./91.)

Plastic-elastic behaviour of high-molecular materials.—E. Jenckel shows that the plastic-elastic properties of high-molecular materials can, to a certain extent, be derived from their structure. This is shown for the so-called freezing temperature, the ageing and the elasticity of Buna S and of polyurethane. ("Kunststoffe," 1950/Mar./98.)

Hardboard is now made from waste wood left by forest fires. Product is derived from compressed, humified and packaged pulp. Obtainable in various hardnesses from rock hardness to that of lumber. ("Chem. Engineering," 1949/Aug./78.)

Phenolic laminate.—Notched impact specimen of new grade laminated material produced by Synthane Corp. Oaks Pa., resisted 5,000 blows from a weight of 1 lb. dropping from 1 ft. height, as compared with 50-100 blows of previous types. ("Machinery" (N.Y.), 1950/Feb./186.)

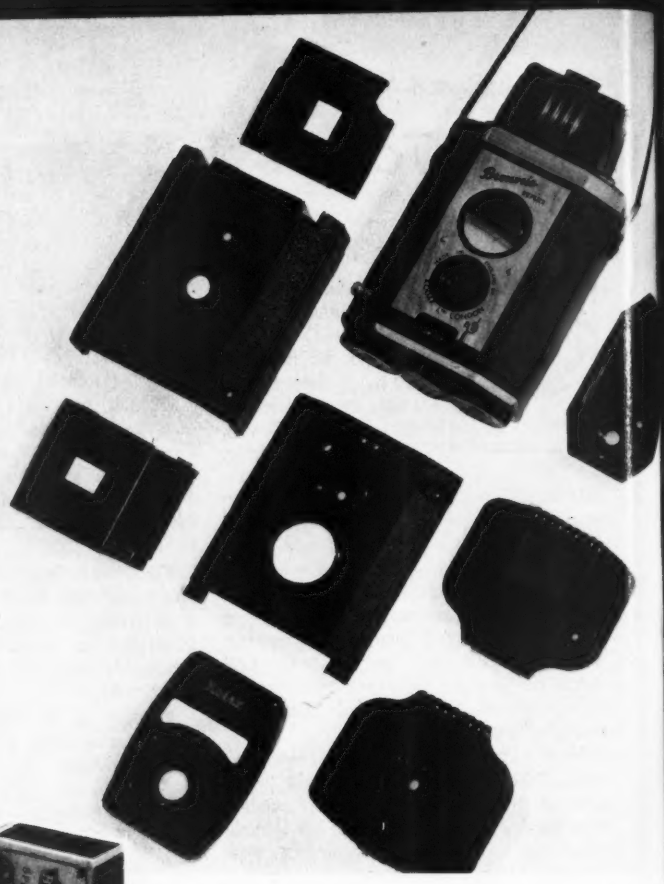
Casting resins in the automotive industry.—A survey of the most advanced uses of casting resins are given by W. M. Stark. Examples: manufacture of torque converter-type automatic drives from plastic die models taken from templates. ("Automotive Industries," 1950/Jan. 15/39.)

PLASTICS
IN THE SERVICE OF MAN

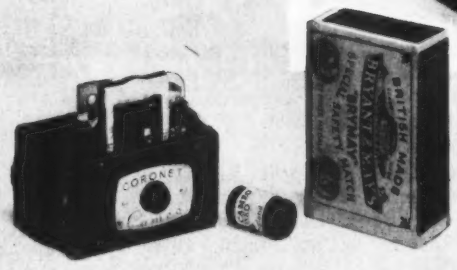
A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

13. Photographic, Printing and Artists' Equipment

(Above) The "Purma Special" camera, manufactured by Purma Cameras, Ltd., and distributed by R. F. Hunter, Ltd., has a black "Bakelite" phenolic body.



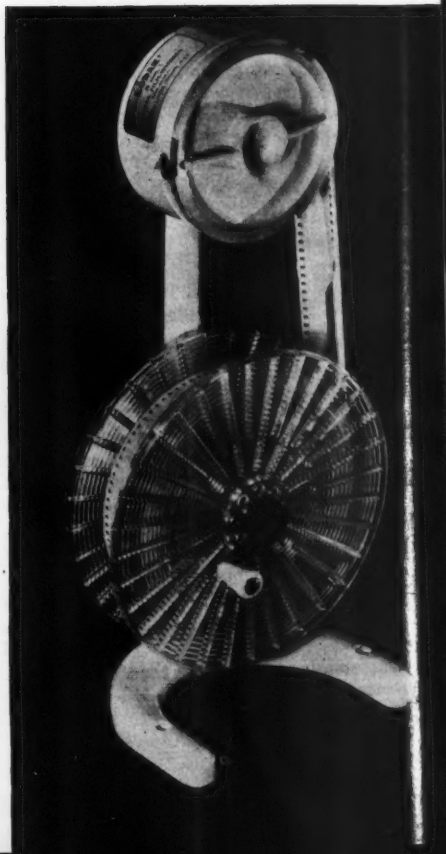
(Above) Moulded "Bakelite" phenolic components of the "Brownie" reflex camera, made by Kodak, Ltd., are displayed around the complete camera. (Photo: Courtesy, Bakelite, Ltd.)



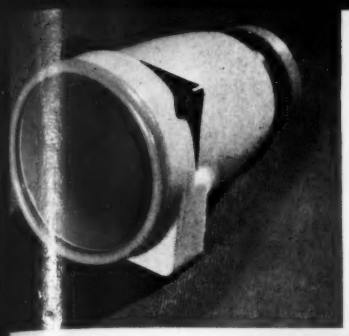
(Right) The black cellulose acetate housing for the tiny "Coronet Cameo" camera, manufactured by Dufay-Chromex Ltd., is injection-moulded in one shot on a 4-oz. machine. (The match-box clearly indicates the size of the camera.) ("Plastics," 1947/437.)

(Above) Large photographic developing tray made in wire-reinforced cellulose acetate by Thermo-Plastics, Ltd.

(Left) This developing tank for a photographic processing unit for Charles Towis and Co., of Northern Ireland, was also manufactured by Thermo-Plastics, Ltd., from reinforced cellulose acetate.



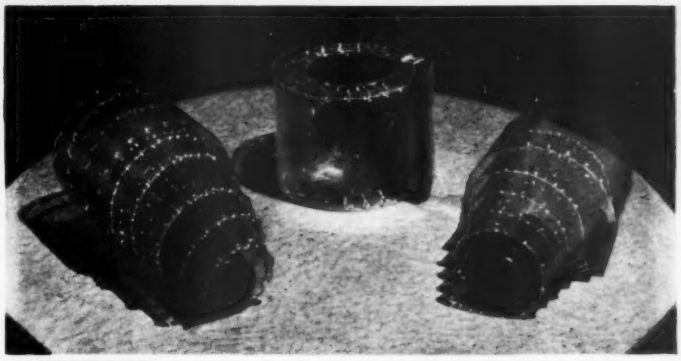
(Right) The "Kodak" 35 mm. spiral film winder, a component of the "Kodak" 35 mm. spiral film processing outfit, makes use of a transparent plastic spool.



viewing miniature colour transparencies, moulded in grey "Scarab" phenolic and red "Beetle" urea materials (British Industrial Plastics, Ltd.) by Brookes and Adams, Ltd.

(Right) The housing of the Weston photo-electric exposure meter made by Sangamo Weston, Ltd., consists of three black "Bakelite" phenolic components, compression moulded by the manufacturers.

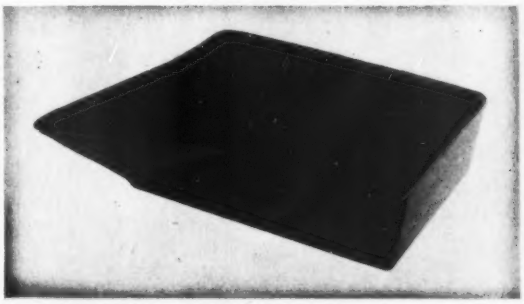
(Right) Celluloid "aprons" with special corrugations to space film layers, are manufactured by The General Celluloid Co., Ltd., for use in photographic developing tanks.

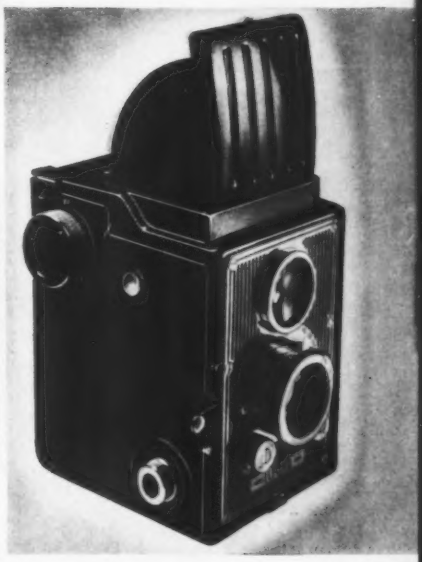


(Below) The "Craftsman" camera, of the reflex finder type, made by Ilford, Ltd., has a black plastic body moulded in phenolic materials.

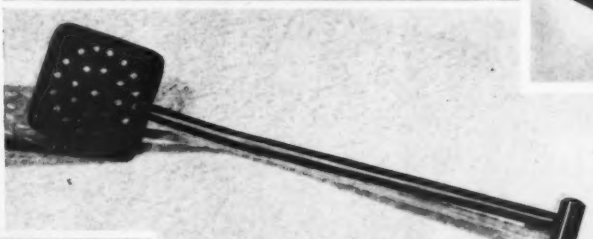
(Above) The "Avo" exposure meter has recently been redesigned and housed in ivory-white plastics. The housing is moulded by E. Elliot, Ltd. for The Automatic Coil Winder and Electrical Equipment Co., Ltd.

(Below) Developing dish with special large lip for quick, safe pouring, and grooves to prevent plates sticking to the base by suction, moulded by United Ebonite and Lorival, Ltd., and distributed by Ilford, Ltd.



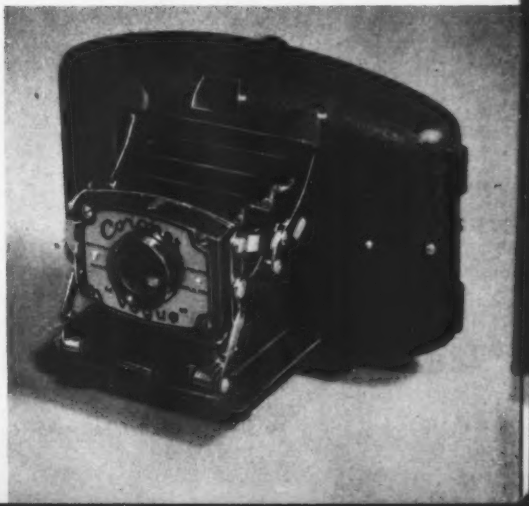


(Right) Perforated print paddle in black celluloid, manufactured by The General Celluloid Co., Ltd.



(Below) The Coronet "Vogue" camera is housed in a "Bakelite" phenolic case, moulded by E. Elliot, Ltd.

(Left) Three black phenolic mouldings by British Moulded Plastics, Ltd., form the major components of the "Photax" developing tank made by Photax (London), Ltd.

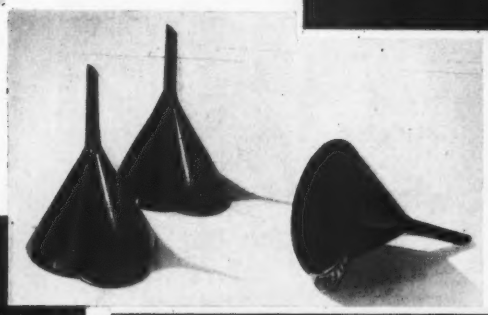


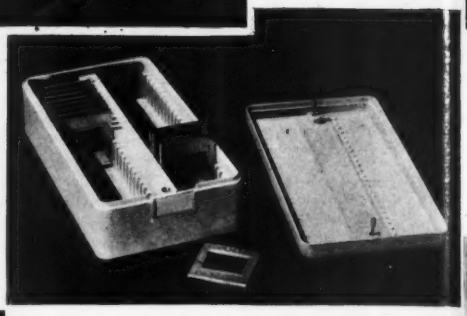
(Left) Photo-electric exposure meter, model C, made by Ilford, Ltd., with black phenolic body moulded by Salford Electrical Instruments, Ltd.

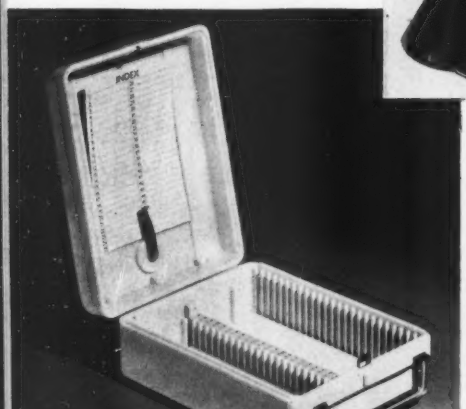
(Below) Phenolic funnels with special lip for handling, moulded for Ilford, Ltd., by Electro-Heat Mouldings, Ltd.

(Left) The "Velox" siphon washer made by Kodak, Ltd., used in the large-scale processing of photographic prints, has six bowls formed from "Perspex" acrylic sheet.

(Below) Moulded slide storage box for "Kodak" 35 mm. transparencies.





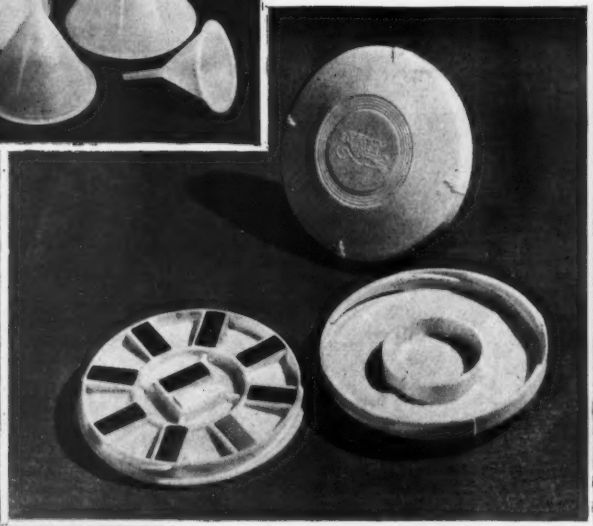


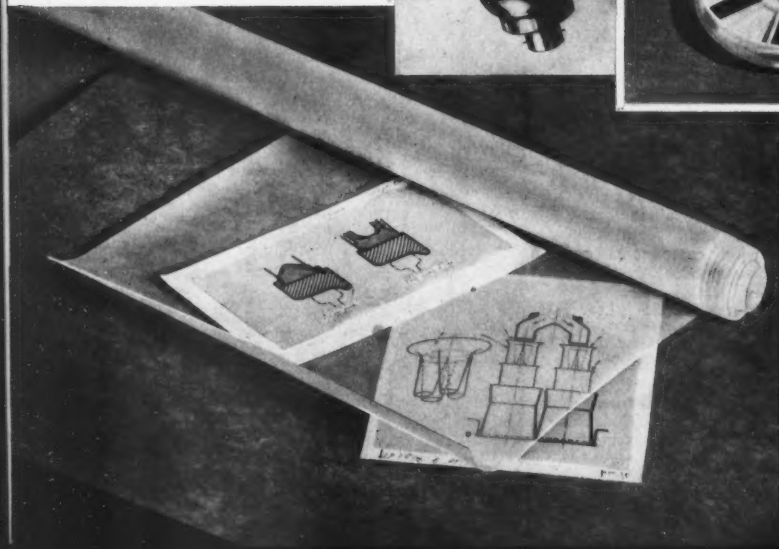
(Above) Storage cabinet for 35 mm. film slides moulded in cream urea by United Ebonite and Lorival, Ltd., for Ilford, Ltd.

(Left) Polythene funnels made in a large range of sizes by J. F. Kenure, Ltd.

(Right) "Brownie" safe light with coloured translucent plastic cover for dark room use, manufactured by Kodak, Ltd.

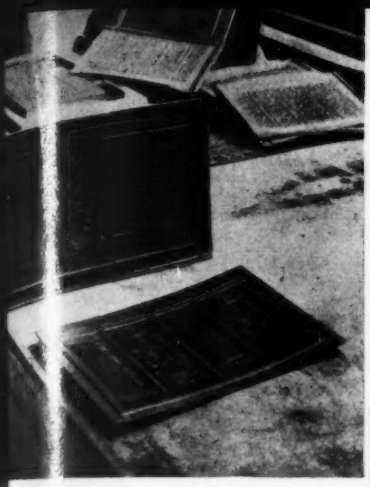
(Below) Ethulon tracing film, based on ethyl cellulose, replaces tracing paper in many applications. Dimensional stability, excellent transparency and resistance to warping under humid conditions are the great advantages of this film, manufactured by May and Baker, Ltd.



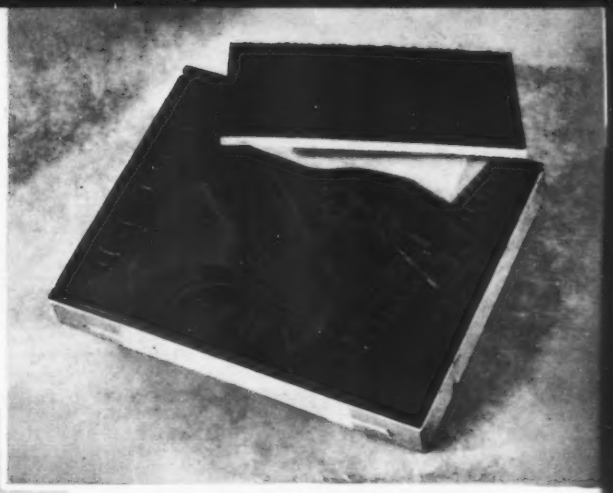


(Above) Ostwald circular colour box moulded in "Beetle" urea for Winsor and Newton, Ltd., by Illingworths (Plastics), Ltd. (Photo: B.I.P., Ltd.)

(Right) "Conograph" air brush made by Connor Patents, Ltd., with black cellulose acetate case moulded by British Moulded Plastics, Ltd.



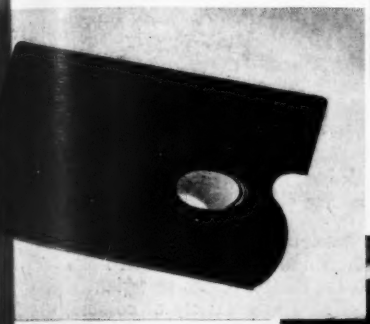
(Left) Stereotypes of thermosetting materials are produced by the Holite process. A matrix is first moulded from several layers of resin-impregnated Holite paper; the stereo is then produced from the matrix by filling in with thermosetting powders and moulding with further layers of impregnated paper. (Photo: "British Catalogue of Plastics.")



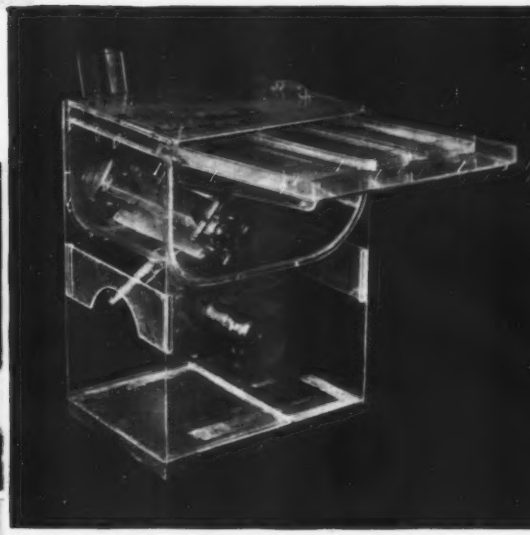
(Above) Printing plate moulded in specially compounded p.v.c.; the hard printing surface of these plates, manufactured by Plastic Printing Plates, Ltd., are backed by a thicker, more flexible layer of similar material.

(Below) Etching machine for use in photo engraving constructed entirely from "Perspex" acrylic sheet by D. O. Nicoll, Ltd.

(Right) Inking roller made from "Velvic" p.v.c. paste by Imperial Chemical Industries, Ltd., Plastics Division.



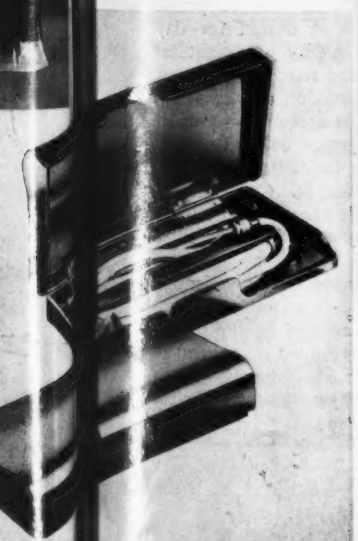
(Below) Matrix of "Bakelite" thermosetting printing material being removed from the type forme after moulding. Printing plates are produced from this matrix by a similar moulding process. (Photo: Bakelite, Ltd.)



ve) Paint palette made by or and Newton, Ltd., of "Bake- resin-bonded paper laminate, hich does not warp or crack.

Ink injector moulded in tyrene with flexible p.v.c. and urea cap, made for or and Newton, Ltd., by Cascelloid, Ltd.

(Below) Printed, and dusted with aluminium powder to improve opacity, "Clarifoil" cellulose acetate sheets (British Celanese, Ltd.) are used by Sun Printers, Ltd., as photographic positives for printing the carbon tissue used in the photogravure process.



(Above) Matrices made from p.v.c. sheet replace wax in the McLaughlin Machinery, Ltd., process of electrotyping. The moulded matrix is here being sprayed with silver prior to the electro-deposition of copper. ("Plastics," 1949/Dec./121.)

"Holoplast" panels are being used as external cladding in the complete construction of a prototype school (Clarendon School, Oxley, Herts) for Hertfordshire County Council. This is the first experiment on a large scale in this country in the application of plastics used externally. (Courtesy, Holoplast Ltd.)

Plastics in Building—III

By JOSEPH B. SINGER, B.Sc.(Arch.)

THE use of corrugated sheet plastics pressure-bonded to plywood was described in the previous instalment of this series (August, 1950, page 213). A similar material, phenol-formaldehyde laminate, has been developed in this country by Holoplast, Ltd., and used under the trade name of "Corroplast" for roofing.

The design of this new product is based on corrugated iron and Trafford (asbestos cement) tiles, but it is intended to overcome some of the shortcomings of the established materials. The fixing of corrugated iron is done with ordinary bolts and round washers, a method which proves unsatisfactory owing to inadequate cover of the bolt hole by the washer and subsequent oxidation of the iron and leakage of rain through the joint. Where rubber or composition washers are used in place of ordinary metal washers, there is likelihood of these washers perishing on long exposure to the weather. Asbestos cement tiles provide a better roof covering, but like corrugated iron they also have a dull and uninteresting appearance.

"Corroplast" is manufactured 48¾ ins. wide and 1/10-in. thick, in lengths up to 8 ft. The pitch of the corrugations is approximately 3 ins. Ordinary joinery equipment is used for drilling and cutting the standard sheets to any requirement. The method of fixing is similar to that used for asbestos cement tiles, i.e., the normal type of galvanized hook bolt and diamond washer, as indicated at Fig. 1. The lightness of the material (13 oz. per sq. ft.) facilitates fixing and permits the use of light structural roofing members. Purlins are most economically spaced at 3-ft. 9-in. centres, and the "Corroplast" sheets should have an overlap of 6 ins. at top or bottom and 4 ins. at the sides. Edges and bolt holes are corrosion resistant, due to the nature of the material.

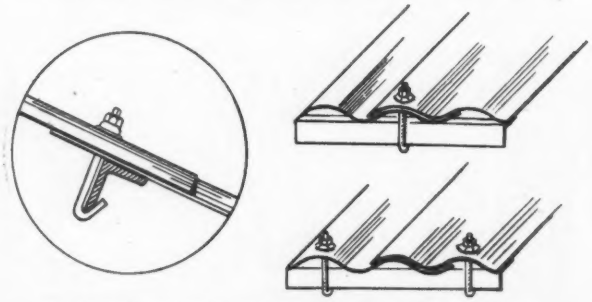


Fig. 1.—"Corroplast" used as a roofing material: (left) section through purlin, (right) alternative methods of overlapping and fixing.

"Corroplast" sheets are produced in a variety of colours, including dark chocolate brown (which is recommended for smoke polluted atmospheres) and pastel stove-enamelled blue, pink, green, French grey, white and cream. This wide choice of colour makes it possible to give new life and vigour to town buildings, in contrast to the dull monotones of the traditional roof coverings. The manufacturers claim that the product has lasting quality and permanence of colour. The high strength/weight ratio of the material (which is strong enough for a man to walk upon), fire resistance and thermal insulation superior to corrugated iron are advantages that should enable this material to establish a place among other roofings.

Translucent Walls and Partitions

Spaciousness and lightness are the trends in contemporary architecture which can be achieved by an extensive use of translucent walls in the form of either blocks or panels. In general the most important factors in design for daylighting are the amount of light, its quality or brightness, elimination of glare, contrast of light and shade, and colour. In the case of light coming from one direction only, shadows contrasting sharply with illuminated parts are produced; in the other cases, where a light of fairly equal intensity comes from a number of different directions, the contrast is inadequate and there is a lack of clarity of shapes. Consequently, it is evident that optimum conditions are achieved only when there is a predominance of light from one direction, reinforced by another source, or general diffusion.

A different method, which is also based on the scientific control of light is designed to provide a uniform two-directional distribution of light, as exemplified by the use of corrugated "Perspex" units which are arranged in a chequer-board pattern throughout the whole pitched-roof area. These units are manufactured to match corrugated asbestos and steel sheets and to eliminate the necessity for special framing, glazing bars, and flashings.

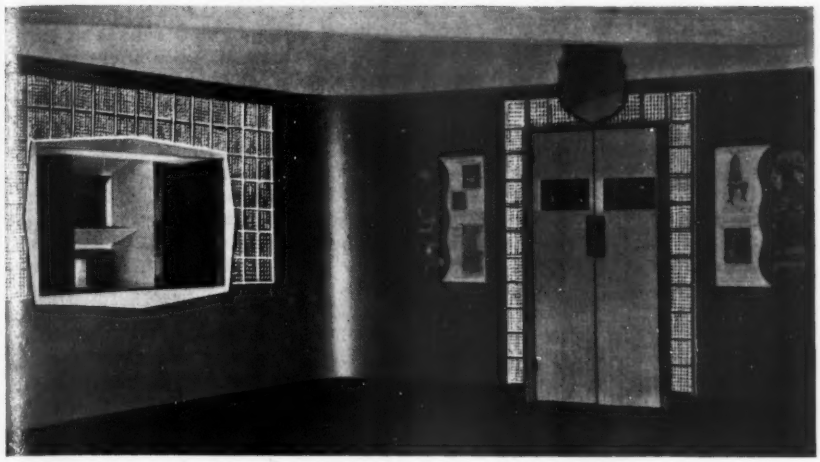


Fig. 2 (left).—"Luma-Blok," an interlocking partition block moulded in polystyrene by British Moulded Plastics, Ltd., as used at the showrooms of W. N. Froy and Sons, Ltd., Hammersmith, London, who are distributors of this product for Southern and Eastern England. (Photo: Courtesy, W. N. Froy and Sons, Ltd.)

The light normally emitted by light sources is accompanied by invisible shorter wave (ultra-violet) and longer wave (infra-red) energies. The potentialities of translucent panels should therefore be explored with a view to the control of wave-lengths. It is suggested that translucent panels could filter out the hot infra-red rays and allow only the purifying ultra-violet rays to pass, or, in reverse, allow only the infra-red rays to enter the room. This could be carried even further by replacing the panels at certain times of the year, and thus changing their filtering properties with differences of temperature. These theoretical considerations cannot, however, materialize at present, due partly to our still imperfect knowledge of this subject and the uneconomical aspect of the enterprise, although other possibilities, e.g., light-diffusing panels, are feasible.

Apart from the direct rays of the sun, a large proportion of light that enters buildings is actually in the form of light scattered from the sky. This scattered light is produced by the interruption of direct sunlight by small water particles and oxygen molecules in the atmosphere.

When a ray of light strikes a surface which is of sufficient

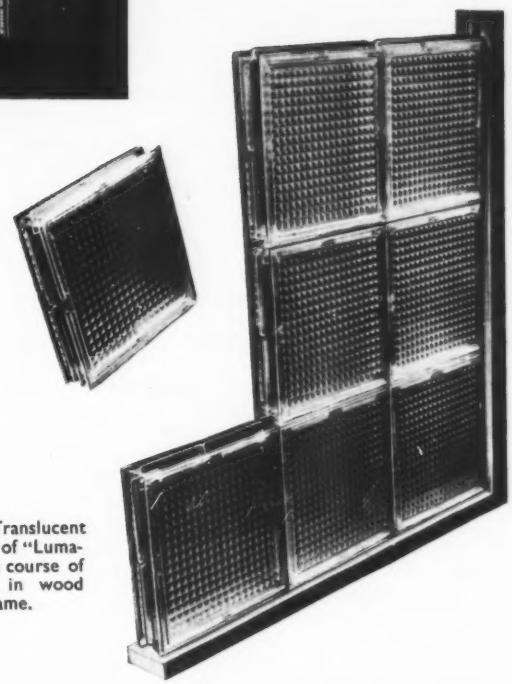


Fig. 3.—Translucent partition of "Luma-Blok" in course of erection in wood frame.

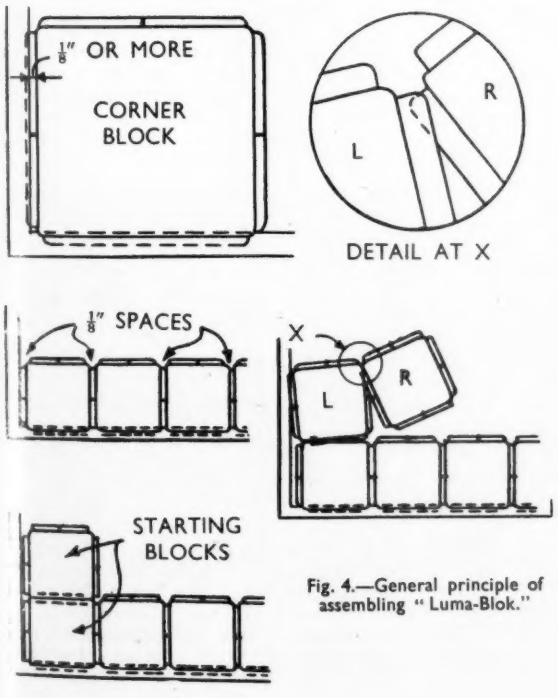


Fig. 4.—General principle of assembling "Luma-Blok."

roughness, the light becomes scattered, thus producing brightness in all directions and a diffuse reflection. This is of particular importance for translucent materials, known as diffusers, whose main purpose is to give protection from direct solar radiation while retaining a high ratio of light transmission. Sky-lights and lay-lights on low pitch roofs or flat roofs, which are most directly exposed to the semi-dome of sky as a source of light, give the best results in brightness per unit of glazed area. Another application of diffusers is for light situated above transoms to allow the lower part of the window (with non-diffusing glazing) to be covered against penetration of sun while the upper part filters out cool light.

Diffusing panels could be built up from two smooth surface sheets of glass or plastics with an interlayer of either (a) glass fibre with synthetic resins, (b) glass fibre with plastics and air, or (c) plastics and air. Standard white colour is preferable, though other colours are possible, by colouring the glass fibre or the resins. Fibreglass with polyester resin has been already developed in the form of sheets 0.05 to 0.06 in. thick weighing only 7½ oz. per sq. ft.; these sheets are produced in colours ranging from aquamarine through yellow to green and rose.

The strength of the laminated diffusing panels would allow the manufacturer to make them in large sizes up to 72 ins. by 144 ins., either flat, bent, or dome-shaped. Decorative possibilities, non-splintering quality, and ease of cleaning would be valuable assets, but it must be realized that horizontal

shadows can be eliminated only when the panels are used on roof-lights and lay-lights alone, and when side-light illumination additionally is provided its area must be sufficiently large and the reflection of the ceiling adequately high in order to reduce the horizontal shadows to a minimum.

The first plastics blocks for external use were developed in 1940 from styrene and "Ethocel," but the material deteriorated after a time and no further progress in this field was possible without improvement in quality.

Hollow-pressed glass blocks, which served as a prototype for that experiment, have similar applications; future research will therefore be based on the experience gained from use of glass blocks. The glass blocks are comparatively heavy and expensive, and are manufactured in two sizes, 5¾ ins. by 5¾ ins. by 3⅞ ins. and 7¾ ins. by 7¾ ins. by 3⅞ ins., weighing 3 lb. and 6 lb. respectively. The air cavity is provided for better insulation and elimination of condensation troubles; the pattern on the inside faces is for light diffusion. Mortar is used for jointing the blocks, and the cill is coated with asphalt emulsion, or similar material, before laying the first course. Reinforcing strips of expanded metal are built into every third to fifth course, and intermediate supports are provided to resist wind pressure and other stresses in panels more than 20 ft. in width or height. The panels are built into recesses with a ½-in. clearance at the sides and the top to prevent strains, due to settlement and expansion, but this allowance for movement is not necessary for panels measuring overall 8 ft. by 2 ft. or 6 ft. by 3 ft.

Light-translucent partitions are used extensively to-day for screening and decorative purposes, and the recently developed polystyrene blocks (Figs. 2-4) are aimed at providing a material for light partitions which are pleasant in appearance and economical in construction.

Each of these polystyrene blocks is built up from two face pieces and the central part, which are separately moulded. The face pieces have facets patterned on the inside surface, but the external surface is smooth in order to avoid the collection of dust; apart from its decorative value, the faceted pattern has the main object of diffusing light. The three separate parts of these moulded polystyrene blocks are cemented together to form a homogeneous unit, and the joint is obscured by the projecting flanges of the face. The central part of the block is provided with projecting ribs which are staggered and set to opposite sides of the centre line to ensure a better interlocking of the blocks when built up to form a partition. These ribs provide sufficient rigidity between adjacent blocks and the complete assembly is stiffened still further by metal or wood framing with vertical supports. Cement is very seldom employed in fixing.

As with glass, the polystyrene blocks are designed to carry only their own weight, but this weight is only one-fifth that of glass. This lightness facilitates easy erection; it also reduces cost of transport and danger of breakage in transit. Polystyrene blocks, however, should only be used internally owing to the detrimental effect of ultra-violet light. Direct exposure to the rays of the sun results in yellow staining, but normal window glazing gives sufficient protection.

(*To be continued*)

Notes from the British Plastics Federation

National Illumination Committee

The Federation has become a co-operating organization with the National Illumination Committee of Great Britain. Dr. W. E. Harper, of Imperial Chemical Industries, Ltd., has been elected to represent the Federation on this Committee.

Publicity

The Publicity Committee of the Federation has been actively engaged in advising the Council of Industrial Design on the use of plastics in the Festival of Britain 1951 Exhibition. This includes not only the South Bank Exhibition, but also the Floating Exhibition in the Aircraft Carrier "Campania" and the Travelling Exhibition. The selection of exhibits in the Hall of Achievement, adjacent to the Hall of Production, in the South Bank Exhibition, will show exhibits which have been accepted for the stock list.

Tropical Conditions Tests

The Interservices Panel of the Ministry of Supply on which the Federation is represented, is now beginning to receive reports on results of the behaviour of plastics materials under tropical conditions from the exposure of these materials in the Tropical Testing Establishment in West Africa. The first of these reports has been received.

Tariffs and Overseas Trade

The Federation has been co-operating with the Board of Trade in connection with negotiations to be held in Torquay, September, 1950, regarding tariffs and trade in various overseas countries.

Nomenclature

Discussions have been held in Brussels with regard to an international nomenclature of plastics materials for tariff purposes. The Federation, co-operating with the Board of Trade and the Customs and Excise Department, has agreed a suitable formula for the nomenclature of plastics materials for this purpose.

Sea Freight

Negotiations with various shipping companies with regard to sea freights for plastics materials have been proceeding. Negotiations with the South American Conference Lines were concluded recently.

Polystyrene Tiles

The Injection Moulders Section Technical Committee is drafting a specification for polystyrene wall tiles.

Moulding Plant

The Engineers Group has recently submitted a quarterly survey of the potential production of plant to the Ministry of Supply. The competition from manufacturers of German injection moulding machines has been considered. It was found that, in general, the capacity of these machines appeared to be highly over-rated as compared with the rating used by British injection moulding machine manufacturers.

Raw Material Supplies

The Raw Material Suppliers' Group reports that a regular interchange of information between the phenol and cresol producers and consumers has taken place to the mutual benefit of both parties.

Moulding Powder Imports

The British Plastics Federation reports the following details of private account imports of moulding powders for May, 1950:—

Licences issued:	Tons	£
Cellulose acetate-butyrate (U.S.A.)	29	10,837
Polystyrene (Canada) ...	15	3,652
Polystyrene (Germany) ...	—	—
Arrivals:		
Cellulose acetate-butyrate (U.S.A.)	21	8,330
Polystyrene (Canada) ...	223	43,833
Polystyrene (Germany) ...	—	—

Plastics Institute

Results of Associateship Examination

The results of the first examination for the Associateship of the Institute have now been announced. Of the nine candidates, seven were successful, two having been referred in single subjects:—

J. B. Cameron, B.Sc., A.R.I.C. (Fairey Aviation Co., Ltd.), Acton Technical College: English, Industrial Administration, Chemistry of Plastics I and II, Technology of Plastics I and II.

A. D. Chesmer, National College of Rubber Technology (full-time student): English, Industrial Administration, Chemistry of Plastics I and II.

J. Daniel (Rolls Razor Co., Ltd.), Acton Technical College: English, Industrial Administration, Plastics Machines I and II, Technology of Plastics I and II.

H. F. Henning, B.Sc., A.R.I.C. (Indestructible Paint Co., Ltd.), Acton Technical College: English, Industrial Administration, Chemistry of Plastics I and II, Technology of Plastics I and II.

S. Lustigman, B.Sc., A.R.I.C. (Distillers Co., Ltd.), Acton Technical College: English, Industrial Administration, Chemistry of Plastics I and II.

G. J. Nichols, National College of Rubber Technology (full-time student): English, Industrial Administration, Chemistry of Plastics I and II.

J. E. Tomlinson (Clayton Aniline Co., Ltd.), Manchester Technical College: English, Industrial Administration, Chemistry of Plastics I and II.

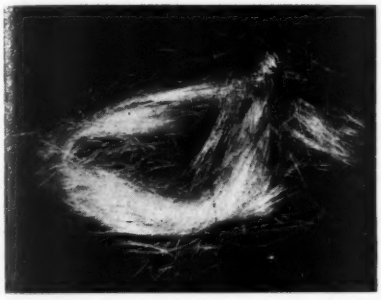
GAUGE AND TOOL MAKERS ASSOCIATION.—In conjunction with the Gauge and Tool Exhibition next May, the Association proposes holding a competition in craftsmanship and draughtsmanship for apprentices and learners attached to member firms.

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Polystyrene Fibre

Sir,—You may be interested in the enclosed fibre, which is being made in Mexico. This is a polystyrene product, and although I am aware that such a fibre has been produced experimentally I do not know of any firm in the U.S.A. or England who actually makes it on a commercial scale. In Mexico it is primarily used as a Christmas-tree decoration, and apparently last year the demand was so great that the manufacturer had to refuse accepting further orders.



I understand that due to its excellent dielectric strength, resistance to chemical agents and resistance to water absorption, this fibre has potential possibilities for filtration, electrical insulation, etc.

The producers in Mexico would be interested to sell this product to England, or, alternatively, find a firm willing to produce this article under licence in Britain.

AAB CENTRO-AMERICAN CO., LTD.
4, Broad Street Buildings, E.C.2.

World's Largest Injection Machine

Sir,—Regarding our new 200-oz. press, we are enclosing two photographs which show the general size and appearance of this press. You may feel free to use these photographs.

Regarding details, we presume you have a copy of the July issue of "Plastics Industry," 370, Lexington Avenue, New York, 17. The front cover of this publication and the article on page 11 describe the whole thing. So far we have made only one piece at a time, this being the television mask as shown on "Plastics Industry" cover. Within a few days we will be making two of these pieces at a time, which will be about a 75-oz. shot in polystyrene. We feel that we can keep this machine busy on the larger sizes of radio and television cabinets, and possibly some styles of table tops, chair seats, etc.

Greenloch, N.J. A. L. HYDE.

[EDITOR'S NOTE: We referred to this machine in one of our recent Editorials ("Plastics," August, 1950, page 208).]

Resilient Concrete

Sir,—In the issue of "L'usine nouvelle" (Paris) for June 15, the name of your paper has been mentioned at the bottom of a note which refers to the thermoplastic material employed in making resilient concrete. We should be most obliged to you if you could supply us with any further data on this subject, and also with the name and address of the firms who may supply the plastic material which is added to ordinary concrete to increase its elasticity.

LA CIMENTERIE BELGE "CIMBEL," S.A.
Brussels,
Rue de Trèves 96.

[EDITOR'S NOTE: Presumably our correspondent refers to the article on "Thermoplastics in Resilient Concrete," by N. W. Farmer, which was published in "Plastics," April, 1950, page 89. Polyvinyl acetate emulsions suitably compounded for this work are manufactured by Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey.]

Laminates

Sir,—We are writing to ask for your assistance in locating a plastic product known, we believe, as "Laminex," which apparently is in use in Australia. This material may be ironed on to woodwork, producing a non-inflammable surface of such strength that it is very difficult to mark. We understand that this line is manufactured in the United States, and would appreciate anything you can do in directing us to a likely source of supply, as we are confident that there would be a very ready demand for this line on our New Zealand market.

P.O. Box 462, SPEDDING, LTD.
Auckland, N.Z.

[EDITOR'S NOTE: The trade name "Laminex" refers to laminated resin-impregnated paper or fabric made by United Ebonite and Lorival, Ltd., Little Lever, nr. Bolton, Lancs, and used particularly in the form of mouldings.]

"B.A.R." Board

Sir,—In "Plastics" for December, 1948 (page 626), we notice an article on the B.A.R. process of board production. We are interested in starting this kind of industry in India, with British machinery. We would therefore like to receive complete details of the plant required.

LUTHER (INDIA), LTD.
9, Vasant Breezy Chambers,
467, King's Circle,
Bombay, 19.

Lifting Truck

Sir,—We are desirous of contacting a maker of a truck or carrier, hydraulically operated, for lifting heavy plastic moulds or masses on to plastic machines.

ROSING BROTHERS AND CO., LTD.
95, Gresham Street, E.C.2.

[EDITOR'S NOTE: A portable lifting truck made by Power Jacks, Ltd., Valetta Road, Acton, W.3, was described and illustrated in "Plastics," May, 1949, page 266.]

Injection moulding machine by The Watson-Stillman Co., Roselle, New Jersey, U.S.A.

Shop Fittings

Sir,—As subscribers to "Plastics" we are anxious to get in touch with manufacturers of plastic coat hangers; also oblong trays in "Perspex" in pastel shades. The trays are required for use in drapery and haberdashery departments, and any help that you can give us in the matter regarding the above items would be greatly appreciated.

D. MATTHEWS AND SON, LTD.
14, Manchester Street,
Liverpool, 1.

"Pearl Essence"

Sir,—We are interested in obtaining supplies of mother-of-pearl for colouring polystyrene, but have difficulty in finding suppliers of this material.

COMMERCIAL PLASTICS, LTD.
Willington Quay,
Wallsend-on-Tyne.

[EDITOR'S NOTE: Cornelius Produce Co., Ltd., Ibex House, Minories, E.C.3, and R. C. Lovington, 7, Rosemont Mansions, Lithos Road, N.W.3, are suppliers of "pearl essence."]

Embossed P.V.C. Sheet

Sir,—I am anxious to purchase embossed p.v.c. sheets 2 mm. thick and would like to know sources of supply.

KENCRAFT.
49, Southdown Road,
Shoreham, Sussex.

Reinforced Plastic Sheeting

Sir,—I would be much obliged if you could inform me of names and addresses of makers of reinforced plastic sheeting; this material may be either cotton backed, or cotton reinforced with p.v.c. The names of manufacturers of heavy texture p.v.c. surgical goods are also requested.

R. JONES.
31, Woodmere Avenue,
Watford, Herts.

[EDITOR'S NOTE: Manufacturers of reinforced plastic sheeting include, among others, I.C.I., Ltd., Leathercloth Division, Newton Works, Hyde, Cheshire; Ioco, Ltd., Anniesland, Glasgow, W.3; Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey; Commercial Plastics, Ltd., Willington Quay, Wallsend-on-Tyne.]

Hot-water Plate

Sir,—We understand that there is a baby plate being made in plastic, which holds hot water so as to keep the food warm. Can you give us the name and address of the maker?

V. M. GLYNN, LTD.
Coventry House,
South Place, E.C.2.

Printing on Plastics

Sir,—We are interested in obtaining special machines for printing on a variety of manufactured goods, especially types for printing on plastics, and will be glad if makers of such machines will furnish us with full particulars, quotations and time of delivery.

PLASTICS AND INDUSTRIAL CORPORATION, LTD.
Amar Building,
Sir P. Mehta Road,
P.B. 251, Bombay.

Large Moulding for an Office Filing System

A LIGHTWEIGHT wheel 20½ ins. diameter, consisting of two mouldings in Bakelite material, locked back-to-back, provides the essential feature of a new aid for keeping office records, which is a striking departure from the traditional filing system design.

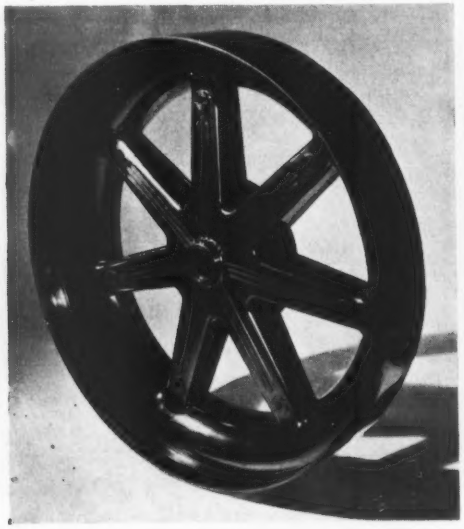
Manufactured by the Chatwood Safe and Engineering Co., Ltd., 3, Laurence Pountney Hill, London, E.C.4, the Chatwood Diebold "Cardineer" holds 6,000 record cards (size 8 ins. by 5 ins.), which are housed in seven separate trays, each of which is secured to the wheel by metal clips.

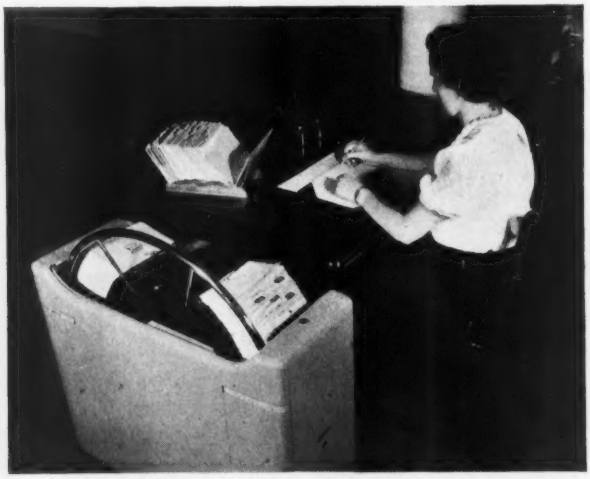
Records are found, removed from the "Cardineer," posted and refiled on the wheel in a matter of seconds. This ease of handling speeds up record keeping and results in a saving of up to 40 per cent. of labour costs for this type of work. It is also easy to remove one or more trays for use by other members of the staff, or other departments, during rush periods.

A battery of four of these pieces of office equipment, holding 24,000 cards, can be operated by one clerk, thus saving 50 per cent. of floor space compared with other filing systems. A further advantage is that this arrangement eliminates much of the fatigue incurred by alternative systems; a recent test showed that the average filing-clerk walks 8½ miles inside the office in one day.

The "Cardineer" wheel is compression moulded in Bakelite material X.20/5 by Ashdowns, Ltd., Knowsley Road, St. Helens, Lancs. Each half of this wheel weighs approximately 9 lb. The finished job is strong and stable, with solid sections and strengthening ribs.

Bakelite material was adopted because of the ease with which relatively intricate shapes of this kind lend themselves to economic quantity production in the plastics moulding shop. Although each half of the wheel is slightly different, the provision of an adjustable portion in the moulding tool allows each half of the wheel to be made with the same tool. This frequently adopted device is an important cost-reducing factor.





The wheel shown on the left is a compression moulding 20½ ins. diameter, weighing 9 lb. Two of these mouldings placed back to back are used in the "Cardineer," seen in the photograph above.

New Productions in Plastics

Lighter Fuel Accessories

The tiny caps seen in the foreground of our photograph of the bottle of lighter fuel are moulded by Insulators, Ltd. They make effective use of the chemical resistant properties of "Vybak" flexible injection moulding compounds and are not affected by contact with petroleum spirit. This neat lighter fuel dispensing device was developed by Hurley Patents, Ltd., for Ronson Products, Ltd., Leatherhead.

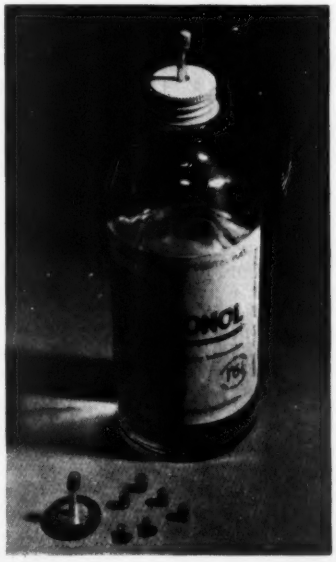
Also illustrated is a plastic pack for Ronson Firebronze lighter "flints," which is moulded in polythene. This novel pack, comprising the polythene holder proper in a protective outer casing of card, is produced by Bettix Ltd., Elm Grove, London, S.W.19.

Radio Cabinet

A new "Ekco" radio cabinet by E. K. Cole, Ltd., Plastics Division, is injection moulded in one piece in polystyrene in various colours. The large size of the moulding (11½ ins. wide by 6 ins. deep by 9 ins. high) requires a 32-oz. press. The injection port or sprue is arranged to be at the centre of the handle, and this is subsequently drilled out so that the hole can be used for the Ekco symbol. Inserts for holding the radio chassis are moulded into four bosses, and these are set below the surface so that by means of a special washer the "live" chassis can be safely insulated. Polystyrene is considered very suitable for the attachment of the three grilles, which are of the same material and can therefore be solidly fixed in position by use of hydrocarbon solvents. From whatever angle you look at this new cabinet, its graceful appearance is preserved, because the moulded grille is seen at back and front. This new type latticed grille was fully described in "Plastics," May, 1950 (page 139). The illuminated tuning scale on the finished cabinet is moulded in clear "Diakon" and produces a "lens" effect to ensure full readability.

"Doidy" Drinking Cup

The cup of novel design for use by invalids and children to which we referred in "Plastics," July, 1950 (page 198), is now available for the home market, having previously been an "export only" job. It is moulded in melamine by Insulators, Ltd., for Martin Russell, Ltd., 143, Cannon Street, London, E.C.4.



(Above) Special pack for "Ronson" lighter "flints" (polythene).

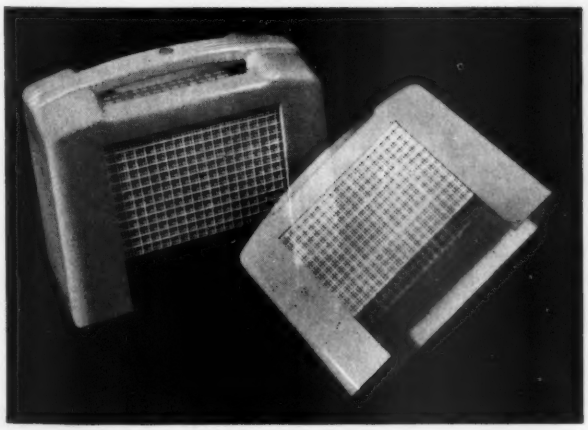
(Left) Cap for lighter fuel bottle ("Vybak").

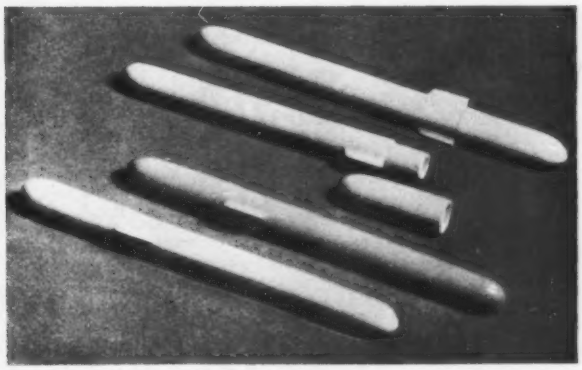
Bandoliers

One of our photographs shows the new bandoliers which are on trial by the Danish Life Guards. They are made from p.v.c. extruded sections supplied by Erinoid, Ltd., Lightpill Mills, Stroud, Glos, and will take the place of leather which has hitherto been used. The advantage obtained is that the plastic bandoliers are easier to keep clean. Our photograph is reproduced by courtesy of "Information Fredag" (Copenhagen).

Clinical Thermometer Cases

Cases, with slip-on caps, for clinical thermometers are being injection moulded in BX cellulose actetate by Capp Plastics, Ltd., 1, Goding Street, London, S.E.11. They are made specially in a range of colours for G. H. Zeal, Ltd., Lombard Road, Merton, S.W.19, who are exporting to the United States and Canada. It will be noticed that a convenient wing-like projection is provided to give a firm grip by the finger and thumb when removing or replacing the cap. A 10-impression tool is used and the moulding is carried out on a Reed-Anderson injection machine.



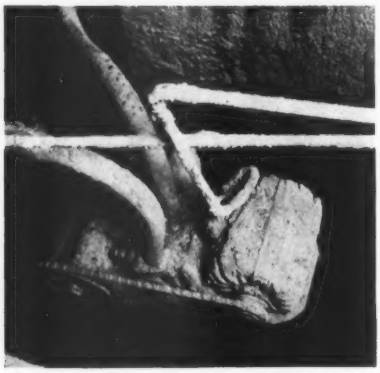


(Above) Clinical thermometer cases (acetate).

(Left) "Ekco" radio cabinet (polystyrene).

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



SEVERE PUMPING CONDITIONS.—The accompanying photograph shows a Girdlestone glandless diaphragm pump engaged in circulating vitreous enamel under abnormally severe conditions. This particular pump was developed by Girdlestone Pumps, Ltd., 23-25, Davies Street, London, W.1, specially for use in industries where corrosive and abrasive liquids have to be pumped. It will even handle solutions containing diamond dust and ground glass. The liquid is completely sealed in the pump and all points subject to leakage, such as stuffing boxes, rotary seals, etc., have been eliminated.

SAWING PLASTICS.—A saw blade of tempered steel wire in spiral form, which is capable of cutting shapes which present difficulties to the usual hacksaw blade, and which, moreover, gives a clean, smooth cut on various plastics, has been brought to our notice by Spiral Saws, Ltd., Bedford Avenue, Trading Estate, Slough, Bucks. As seen from the enlarged view which we publish, the blade has a continuous cutting edge of 360 degrees which makes cutting possible in any direction, and the operator has no need to turn the work. Used for cutting plastics, there is no chipping at the edge of the cut; on rubber, there is no gumming of the blade. It is because it slices at a continuous angle, that this blade does not chip or tear the material, nor leaves a ragged edge. The blades will fit any standard hacksaw frame, or may be used in one of the snap-action frames which the makers supply.

Blades of this type are used in the Tyler bandsaw which we illustrate, also made by Spiral Saws, Ltd. This machine provides for selective speeds from 70 to 5,000 ft. per minute, the former for steel and the latter for wood, fibreglass or other light materials. Special rubber-tyred guide rollers ensure a rigid cutting line, and there is automatic adjustment of speeds for various materials.

(Left) Tyler spiral blade bandsaw, with enlarged view of the blade.

GRAPH RECORDER.—Technical details of new developments in the "Servograph" graph recorders and graph recorder controllers have been received from Fielden (Electronics), Ltd., Paston Road, Wythenshawe, Manchester. These instruments can be used by the processing engineer wherever physical measurement is made in terms of electrical energy and can be connected directly to resistance thermometers, thermocouples, etc. Laboratory and industrial type models are available.

SILICONES.—Albright and Wilson, Ltd., 49, Park Lane, London, W.1, who for the past four years have acted as distributors of silicones in Great Britain for the Dow Corning Corporation of America, now announce their intention to commence the manufacture of silicones in this country. The demand for silicones in all branches of industry has grown considerably since their introduction in the commercial field, and when manufacture begins it will be possible to meet the requirements of many firms whose allocation has hitherto been restricted owing to supply difficulties. Silicone products are at present available in many forms, including heat-stable, water-repellent insulating materials for sealing high-tension ignition systems, and high-frequency equipment; mould release agents and foam inhibitors; special lubricant greases for valves and bearings operating at extremely high and low temperatures; heat-stable, inert liquids for use as damping and hydraulic fluids, heat transfer media, diffusion pump oils, high-temperature lubricants and for waterproofing insulator surfaces; heat-resistant waterproof materials for use in electrical insulation, and as bonding agents and protective coatings; and silastic rubber, a silicone rubber, flexible at −110 degrees F. and at 500 degrees F. and available in grades suitable for moulding, extruding, coating, laminating and caulking.

GLASS TEXTILES.—For about a year past some of the main companies engaged in the production of glass yarn and glass yarn products have been discussing means to further the development of glass yarn products, as a result of which The Glass Textile Association, Ltd., was recently formed. Among other objects the Association is to encourage and develop the production and use of glass yarns, textiles and fabrics, and improve and devise new types of these materials for suitable purposes. Membership of the Association is open to all firms in the trade in three sections:—(1) Manufacturers of glass yarn. (2) Weavers, braiders and other glass-textile manufacturers. (3) Merchants, wire coverers, fabric proofers and others. Further particulars regarding membership may be obtained on application to the Secretary of the Association, Mr. Niel Pearson, c/o March, Pearson and Green, 1, Dickinson Street West, Manchester, 2.

SEBACIC ACID.—The use of sebacic acid in alkyd resins and other polyesters is the subject of Circular No. 1413 received from The Geigy Company, Ltd., National Buildings, Parsonage, Manchester, 3. Dibasic acids have three primary fields of application in the plastics and coatings industries, namely, in producing monomeric ester plasticizers (such as debutyl phthalate), in polyamides (such as nylon), and in polyesters (including alkyd resins). Sebacic acid, on account of its special properties, has lately been attracting much interest in all three fields. The present circular of 12 pages, with a detailed bibliography of 50 references shows that sebacic acid is already established in four separate fields of polyester application, where it is prepared in place of phthalic acid on account of the high mole-

(Right) T. H. and J. Daniels, Ltd., Stroud, Glos, exhibited a moulding press and a preforming machine at the recent Toronto Trade Fair. Both machines were sold from the stand. Our photograph shows Mr. Lionel Daniels, who was on the stand for the duration of the Fair.

ular mobility which it confers on its polyesters, the outcome of its long hydrocarbon chain, and in the high heat-stability of these polyesters. The most important single use of sebacic polyesters is in the production of unmodified or oil-modified alkyd resins (glyceryl or pentaerythrityl sebacates) for use as plasticizers for urea resins or cellulose nitrates, and for the production of glycol polyesters of syrupy consistency and comparatively low molecular weight (such as polypropylene sebacate) for use in high-quality plasticizers for p.v.c., cellulose nitrate and synthetic rubbers. A tabulated summary of the properties and applications of sebacic acid polyesters is included in the circular.

HESS PRODUCTS, LTD., announce that their new plant for the fractional distillation of fatty acids is now completed and in full-scale production at Littleborough in Lancashire.

CHEMICAL WORKS SAFETY.—The Royal Society for the Prevention of Accidents are to hold a conference on "Chemical Works Safety" at the Royal Hotel, Scarborough, September 29 to October 1. A provisional programme can be obtained from the Conference Secretary, Industrial Safety Division, Royal Society for the Prevention of Accidents, 52, Grosvenor Gardens, London, S.W.1.

INDUSTRIAL SAFETY GLOVES.—The British Standards Institution has just published B.S.1651 (1950) dealing with safety gloves, mittens and hand-guards for protection against industrial hazards. From 200 types now produced, the standard selects a range of seventeen preferred types in a minimum range of sizes. The gloves are divided into five groups: leather, plastics, rubber, felt and cotton. Requirements are given for materials, sizes, manufacture and methods of testing. Copies of this British Standards may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 4s. post free.

PERSONAL MANAGEMENT. — The Institute of Personal Management announces a four weeks' course in personal management to be held at Management House, Hill Street, London, W.1, commencing October 23. Membership is designed for executives with a background of industrial experience who wish to secure a knowledge of the principles and ideas which lay behind personal management, and to see it in practice.

INDUSTRIAL DESIGN.—As a new venture in the promotion of well designed consumer goods, the Midland Industrial Designers' Association are co-operating with a large Birmingham store (Lewis, Ltd.) in a pioneer scheme to publicize objects of good design and quality. Every fortnight a Selection Committee appointed by M.I.D.A. will visit the store and select an article which they consider worthy of being the "Designer's Choice." The chosen object will be on display for two weeks in the department from which it has been selected. The M.I.D.A. are prepared to extend this plan to other stores. Further information about the work of the Midland Industrial Designers' Association can be obtained from the Hon. Secretary, Mr. A. H. Woodfull, 47, Farnol Road, Yardley, Birmingham, 26.

PLASTIC EYES.—The American Optical Co. announces that plastic eyes may now be "aged" to keep uniform with possible changes in the real eye which they match. It is pointed out that in advanced age a white ring forms around the iris; a similar ring appears occasionally in the eyes of children. The plastic eye which has to be "aged" is repigmented by hand in those places which require alteration, and for this purpose the artificial eye is covered with a colourless coat of resin.

PROTOLITE LTD., Central House, Upper Woburn Place, London, W.C.1, have sent us an interesting note on the use of "Prolite" for drilling hardened steel. They tell us that the drilling of hardened steel of 62 Rockwell hardness is by no means easy if the standard range of drills has to be relied upon. This job can be done satisfactorily when "Prolite" solid tungsten carbide drills of $\frac{1}{8}$ in. diameter are used.

PLASTICS IN ALGERIA.—The Societe Algerienne de Constructions Telephoniques (S.A.C.T.), 34, Rue Cardinal Verdier, Algiers, is now equipped for the production of moulded plastics components. The maximum annual capacity is said to be 40 tons.

DOWDING AND DOLL, LTD., Greycoat Street, Westminster, S.W.1, have appointed Anglo-America S.A., rua tres de dezembro 43, Sao Paulo, Brazil, as sole agents for Brazil for their British-made range of machine tools, including the Dowding V.6 universal gear hobbing machine, Ahcol nut slotting and rotary machines, Accuratool capstan lathes, Exe grinders, Hayes Die-master milling machine, Wright grinders and Puckert bar feeds.

CRYSTALATE, LTD.—In the announcement of change of address published in our August issue (page 230), the new telephone numbers for the administrative offices of this company should have been given as Tonbridge 2261-2-3-4-5.

LACRINOID PRODUCTS, LTD., Gidea Park, Essex, have sent us particulars of their new lead-filled moulding material "Lacrinite," which is used to produce seal faces where dimensional stability, oil and water resistance, and self-lubricating properties, are desirable. Supplied with phosphor bronze as a filler, it provides an ideal bearing material, which has similar properties in that it is self-lubricating, and water, oil and solvent resistant. The coefficient of friction of these mouldings, when operating against cast iron, is .03, and wear is also very little. Mouldings are dimensionally stable over the range −40 degrees to 400 degrees F. The method used to produce mouldings is similar to the normal compression technique, but higher pressures are required.

ROSEDALE ASSOCIATED MANUFACTURERS, LTD., makers of injection mouldings, 34-36, Oxford Street, London, W.1, regret to announce that Mrs. Ethel Rosedale, a founder director of this company and its associated companies, died on August 7, after a short illness.

INDUSTRIAL PRODUCTION.—The Industrial Applications Section of the Royal Statistical Society is organizing a Conference on "Scientific Method in Industrial Production," when technicians and managements of manufacturing concerns will be able to meet statisticians interested in industrial problems. The Conference will be held at Sheffield University, Friday, September 29, to Sunday, October 1, inclusive. Applications for attendance (fee £1 1s.) should be sent to Assistant Secretary, Royal Statistical Society, 4, Portugal Street, London, W.C.2.

On September 29 there will be two sessions devoted to "Contributions of statistics to industrial production and scientific management," by L. H. C. Tippett (British Cotton Industry), T. G. W. Boxall (London Brick Co.), G. Chehoti (General Electric Co.), A. Ellis (Booth and Colclough), and B. Moorhouse (Rowntree and Co.); and "Costing of continuous processes" (Philip Lyle).

Two sessions on September 30 will include "The cost of inspection" (F. J. Anscombe), "Statistics applied to assembly processes" (G. A. Barnard), "Multiple sampling in theory and practice" (H. C. Hamaker and J. Enters), "Statistics applied to time study" (D. J. Desmond), and "A note on productivity measurement in the U.S.A." (H. Ingham).

A paper on "Graphical analysis of variance as a production department tool" (Miss E. A. G. Knowles and Miss C. Roseman) will be presented on Sunday, October 1.

Mr. W. Charles Waghorne, Director of Insulators Ltd., Member of Council and Past Chairman (1947) of British Plastics Federation, Vice-President of The Plastics Institute.

This drawing was made by Fred May, the well-known cartoonist.

Successful Designing for Plastics Moulding—XIV

By W. M. HALLIDAY

In this instalment the author proceeds to consider examples of bossing, showing preferred design forms, and bossing which is parallel with the mould parting surface. He summarizes many useful points.

HAVING already described some of the more general requirements to be observed when selecting bosses for use in a component design, it remains to depict a number of typical and representative examples of the application of such useful features, so that preferable forms and their practical advantages may be contrasted with the drawbacks associated with less satisfactory design forms which may sometimes be adopted.

The diagrams shown at Fig. 1 depict one of the most common types of bossing, viz., that required to provide a supporting wall for a hole which has to be cored into the side of the component.

The first illustration (A) shows a sectioned front elevation and also a plan view of the relevant portion of the component wall which is bossed. From reference to the lower plan view it will at once be appreciated why such a bossing is needed. The hole to be moulded through the part has to be located with its vertical axis well away from the internal side of the normal wall line of the component. If a boss were not to be included in the design, it would mean that the whole side wall would have to be considerably thickened in order to allow the hole to be situated in the component. Alternatively, the design form of the moulded article would have to be most drastically redesigned so as to fashion a sufficient amount of material around the hole. It will also be especially well noted that the bossed portion branching from the wall of the piece is made part-circular in shape (see full and broken lines in the lower plan view).

In length, the boss extends from the top (open) end of the component down to the internal floor surface. A taper or draught is provided on the sides of this semi-circular boss, as shown, in order to facilitate the withdrawal of the finished component. The hole itself, of the shape shown, has to be cored clean through the boss right down to the base of the component.

The line " a—a " depicts the location of the parting line in the mould. It should be specially observed that the vertical axis of the cored hole in this case lies exactly at right angles to this parting line.

The main core plug forming the major internal configuration of the component and also the core pin for reproducing the hole in the bossed portion, will be contained in the movable half of the mould, and the finished piece would have to be stripped off these core plugs in the usual fashion.

Further, the secondary cavity formation required for the creation of the bossed portion jutting from the wall of the component will also be machined, as a female groove, on the side of the main core plug in the moving mould block.

Thus it will be appreciated that the boss can be very readily reproduced on the component, and there are in fact no serious complications in the way of mould manufacture or ejection of the part. However, whilst this is perhaps the simplest form of bossing, there are certain demerits associated with its use which are worth mentioning at this point.

The chief practical disadvantage arising is that the introduction of such a boss has the effect of creating undesirable disparity in wall thickness throughout the part. For instance, it will be seen that the mass of material concentrated to the right-hand side of the cored hole is very considerable, being practically 2½ times the thickness of the normal wall thickness, as indicated at X.

With the former type of component the heavily massed portion to the right-hand side of the cored hole may be undercured, leaving a weak spot in the centre of this mass, as shown in the diagram. There would also be a great tendency for the thin wall of the part at each side of

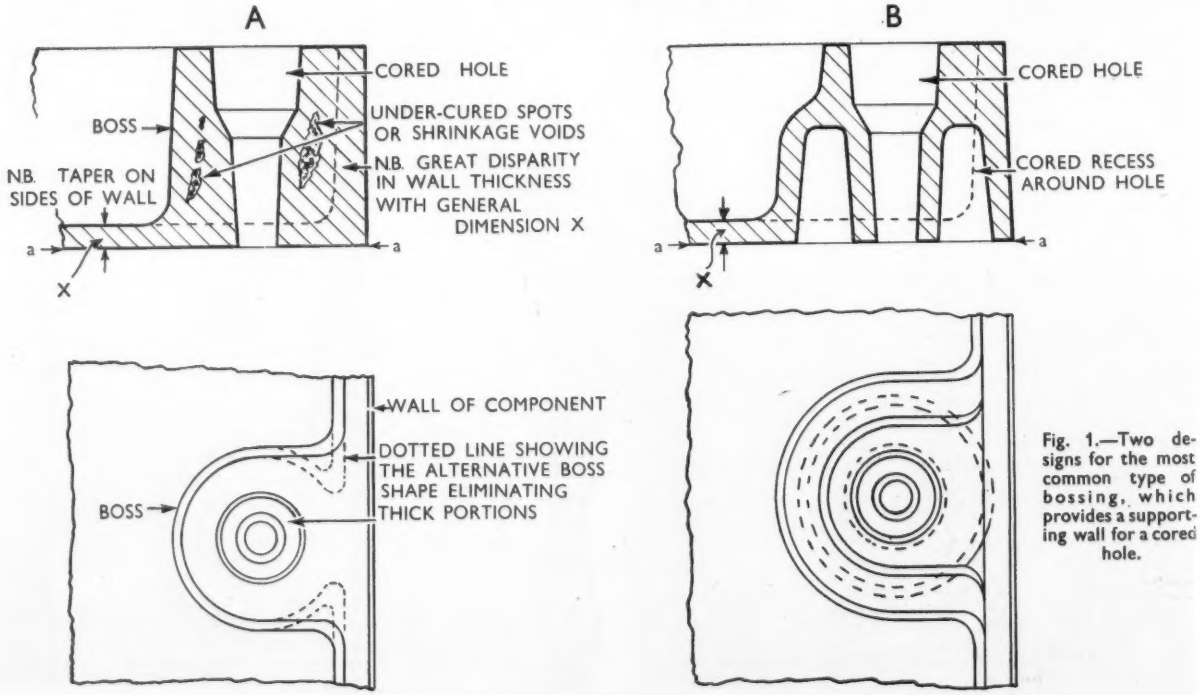


Fig. 1.—Two designs for the most common type of bossing, which provides a supporting wall for a cored hole.

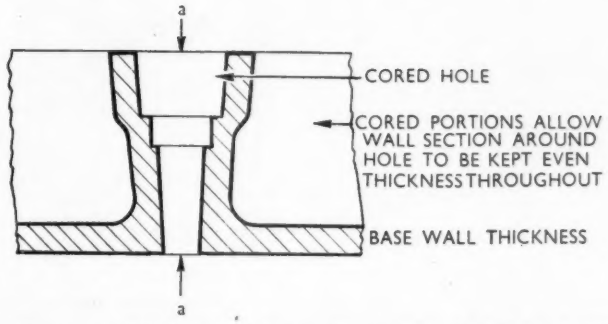


Fig. 2.—Alternative design to the boss shown at B (Fig. 1).

this thick bossed portion to be distorted and warped due to the very unequal contraction stresses arising from the different thickness of material such as are sharply joined to each other.

In the case of an injection moulded component, this same design form would give rise to the formation of internal porosity and contraction voids in the extensive solid areas immediately surrounding the hole. Thus the component would suffer weakness at that point.

With each type of moulding these same irregularities would tend to cause a secondary surface defect by reason of a surface sink or depression occurring on the external surface of the part down the vertical wall. This latter fault would be due to the greatly unequalized shrinkage taking place over the closely joined thick and thin sections of the wall.

Moreover, with an injection moulding, the side of the component adjacent to the heavily massed boss section might be seriously distorted by the uneven contraction stresses.

It is also well worth while noting that if such a component were to be designed with a number of bossed-up portions of the kind shown at A (Fig. 1), there would be a very substantial increase in the amount of material contained in the article, and its cost would have to be higher on that account.

An extremely simple manner in which the foregoing difficulties may be obviated is shown at B (Fig. 1). With this design the shape and disposition of the cored hole are identical with those features in the previous example at A.

The chief objective of this improved and preferred design form is to secure a more uniform wall thickness around the hole, and one which is closely akin in size to the dimension X possessed by the normal base wall of the component. This can be accomplished by two simple design modifications.

In the first modification the bossed portion is maintained semi-circular in shape (see lower view), but the upper portion, i.e., that nearest the open end, is reduced in diameter as shown. This smaller portion of the boss is smoothly blended out by suitable curves to the largest diameter portion lower down the component wall.

The effect of this is to reduce the thickness of material to the left-hand side of the hole, and this point should be compared with the section of the boss wall shown at A.

The second and most beneficial adaptation consists of hollowing out the bossed portion from the bottom side of the component as illustrated. This hollow recess part will, of course, be cored in place, using a suitably hollowed core plug. The diameter of the recess in this core would be such as to form the thin-walled surround for the hole. It will be observed that this recess in the component is formed to a considerable depth, extending in fact almost up to the largest diameter portion of the cored hole.

The mould would be parted in precisely the same manner as before, i.e., along the line "a—a" shown on the component sketch, and the main cores for reproducing the internal shape and the cored hole in the boss would be carried in the movable half of the mould as before.

The stationary mould block in this case would, however, be equipped with the hollow core plug to form the recessing around the lower end of the hole to produce the hollow boss form.

From diagram B (Fig. 1) it will be appreciated that the wall thickness is substantially the same throughout the component, and thus the various moulding troubles, and component defects already mentioned in connection with the preceding example A, will be largely eliminated

With such a modified construction no mould designing or tool-making problems would be created by the inclusion of such an additional recessed core plug, required to hollow out the underside of the boss, because this mould element would be mounted exactly at right angles to the normal mould parting as indicated.

Fig. 2 shows an alternative method which may be adopted, with advantage in numerous instances, to achieve the same objectives as those provided by the design form at B (Fig. 1).

This sectioned diagram of the affected portion of a moulded component illustrates a very common requirement. In this case the article is a hollow box-like part and a hole has to be cored through a partitioning wall running across the interior of the component. The central wall has to be bossed up at a certain point, as shown, so that the hole, of three different diameters, may be correctly located, and in order that the surrounding wall will be formed integrally with the rest of the partition wall.

With this example, it should be noticed, the mould would normally be parted along the line "a—a," this being at right angles to the base of the component, and similarly disposed to the parting-lines employed with the two previous examples already dealt with.

By disposing the mould parting in this plane it will be possible to fashion the respective cavity formations contained in each mould block in such a manner as to closely follow the shape of the hole to be cored, so as to ensure a more or less uniform wall thickness at all points.

If the component according to this design form were to be compression moulded, the core plug for reproducing the hole in the boss would have to be mounted in a separate block, or split, so that it could be suitably withdrawn out of the finished moulded part before the main blocks were parted.

With an injection-type moulding, such a core plug would be carried in a retracting core-slide, the latter element being mounted slidably within guideways formed within one mould block. Such a slide would, of course, have to be actuated and moved into the open position to effect the extraction of the core plug from the hole in the boss before the mould could be opened and the component ejected in the usual fashion.

Such mould arrangements are, however, quite widely used and reasonably simple to install, and with many types of component the little added tool-making cost necessitated by such an adaptation will be well worth while, because of other advantages to be derived, as already explained.

Fig. 3 depicts several undesirable design features, and certain preferred forms in connection with bossing in those cases where such an element has not to be extended throughout the whole depth of the component wall, as with the previous examples just considered.

Where only short bosses have to be formed on the sides of a hollow moulded receptacle of the kind shown in these illustrations, a due amount of care must be bestowed upon their location and shape. This will be necessary, because of the risks of inadvertently disposing such bosses in such a manner as to create undercuts in the component.

This critical point will become more readily understood and its practical importance better appreciated from the following explanation of the various boss design forms and features shown at Fig. 3.

The first illustration to be considered is that shown at A, which depicts a very common and simple form of hollow box component, in cross-sectioned view. This

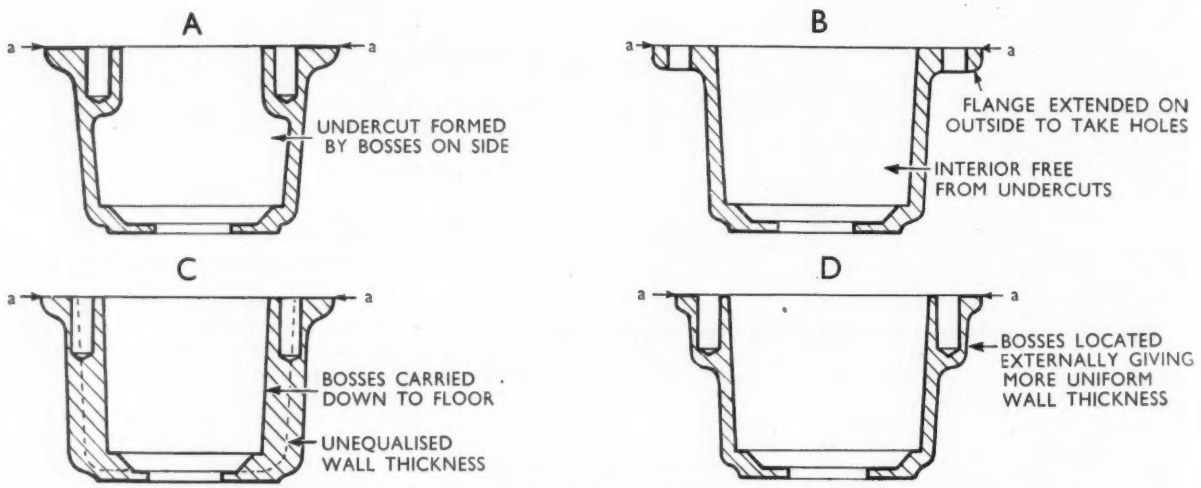


Fig. 3.—Some undesirable features in the design of a moulded component, and certain preferred forms for bossing.

article has to be provided with two blind holes, of short length, these being located near the top of opposed sides of the component. These holes are to be moulded in place by core plugs mounted fixedly in the top moving block. Their purpose is to serve as fixing holes (to be tapped out at a later machining stage), whereby a lid component may be affixed to the box.

These holes are only of relatively short depth in relationship to the total depth of the box, i.e., they are approximately one-third that latter dimension. In order to ensure that they can be located at the proper centre distance apart, the wall of the component has to be bossed as shown.

With this example it should be specially noted that such bossing is formed on the internal side of the component walls, thus leaving the external walls perfectly plain and flat. This latter requirement, incidentally, is sometimes an essential one to be observed by the mould and component designer.

The mould for producing such a component would normally be parted along the line "a—a" and the main core required for reproducing the internal configuration, and the large hole through the base of the article, would be mounted in the top or moving portion of the tool. The two cylindrical core plugs needed to produce the blind holes in the bossed portions would similarly be carried in the same mould member.

In practice such a design form would prove unsatisfactory and difficult owing to the fact that the extension of the side walls inside the component would create undesirable undercut portions immediately underneath the bosses.

To mould such a part as a compression moulding would entail using split core plugs, probably at least three separate elements of this character would be required to perform the operation expeditiously. This form of core construction would be necessary, of course, in order to enable the finished component to be readily extracted from the mould.

With an injection moulded part similar mould construction problems would be raised, in that it would be necessary to employ a collapsible type of core plug, to fashion the requisite undercuts.

Such provisions would not only incur additional mould manufacturing costs, but would also involve some reduction in production speed and the general manipulation of the moulds. This latter feature would be most marked in connection with a split type compression moulding tool. The diagram at B (Fig. 3) illustrates one very simple manner in which the objections may be circumvented.

In this modified design it will be noted that the flanged portion surrounding the external edge of the component at its upper open end is considerably extended, in order that the two fixing holes may be formed therein.

As with the preceding component design the mould for such a part would be parted along line "a—a," and all the core plugs needed would be fixed to the top or moving half of the mould. With this construction no bossing at all is required, and the extension to the flange at the mouth of the component can be very easily arranged in the mould at little additional cost.

There is one drawback, however. It will be realized that the holes pass clean through the thin flanged portion, and also that the length of the holes will be determined by the thickness of the flange. It would not be practicable in practice to make such a flange with a greater thickness than the normal wall of the component. Indeed, in the case of a compression moulded box, it would be preferable to make the flange slightly thinner so as to promote better flow in the mould cavity, since the flange would be located at the highest point in the mould cavity.

Should it be essential to have longer holes, blind in depth, then it might be practicable to provide circular boss extensions to the underside of the flange immediately surrounding the holes.

By this means the wall thickness will be maintained uniform over the whole component, and there would be no undesirable undercut portions as with the previous example.

The diagram at C (Fig. 3) shows a very unsatisfactory method for avoiding undercutting of the kind mentioned in connection with example A. With this design for the same box component as before, it will be noted that the side walls containing the blind cored holes have been thickened up, such portions being extended down to the floor of the box. The result of such a procedure is to increase the wall thickness below the bottom of the holes to a considerable degree, and in practice this would probably give rise to several difficulties. The unequalized wall thickness might result in the heavy masses depicted in the sketch being under-cured in compression moulding, or having porous spots and contraction voids in the case of an injection moulding. Distortion and warpage of the adjacent thinner side walls of the part would also be associated with their production.

The diagram at D (Fig. 3) illustrates yet another preferable design form which may successfully and economically be adopted for overcoming the aforementioned troubles. With this box component, of the same kind as before, internal undercutting is eliminated by the provision of external bosses as shown. These are carried down to sufficient depth on the relevant portion of the outside walls, from the top of the component.

From the illustration it will be specially

(*Continued on page 262.*)

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 638,271. Appl. 24.10.47. Acc. 7.6.50.
Linings of the roofs of motor vehicles. R. H. Newman. To: Humber, Ltd. See 638,270.

B.P. 638,312. Appl. 7.8.47. Conv. (U.S.A.) 24.11.43. Acc. 7.6.50.
Welding of thermoplastic material and the fabrication of products therefrom. Le Roy B. High, G. C. T. Lindh. To: Udylite Corp.

Hot gas welding method for thermoplastic sheet material, particularly for the manufacture of insoles and the like from a plurality of thermoplastic sheets. The sheets are clamped from both sides and a torch with a side outlet for the gas blast moved along the outer contour of the clamping template. The heated end of the torch is used simultaneously for smoothing the welded edges.

B.P. 638,313. Appl. 27.8.47. Conv. (U.S.A.) 27.8.46. Acc. 7.6.50.
Methods of preparing organopolysiloxanes. To: British Thomson-Houston Co., Ltd.

B.P. 638,316. Appl. 12.9.47. Conv. (U.S.A.) 13.9.46. Acc. 7.6.50.
Production of organic esters of cellulose. To: British Celanese, Ltd.

Stabilization of ripened organic esters of cellulose.

B.P. 638,328. Appl. 8.12.47. Conv. (U.S.A.) 7.12.46. Acc. 7.6.50.
Moulding powders comprising fluorine-containing polymers. To: E. I. du Pont de Nemours and Co.

Refers to Br. Patents 572,265, 574,688 and 625,348 and claims reduction in particle size of tetrafluoroethylene moulding powder.

B.P. 638,331. Appl. 16.1.48. Acc. 7.6.50.
Solutions of polyacrylonitrile. R. Hill, R. G. A. New and S. M. Todd. To: I.C.I., Ltd.

Manufacture of articles from pourable solutions of polyacrylonitrile.

B.P. 638,360. Appl. 5.12.46. Acc. 7.6.50.
Manufacture of reinforced plastic mouldings. C. F. Forsdick. To: Hawley Products, Ltd.

Production of hollow thin-walled plastic mouldings using a paper-pulp preform which is impregnated under pressure with a resinous compound.

B.P. 638,364. Appl. 2.4.47. Conv. (Italy) 5.6.44. Acc. 7.6.50.
Extrusion Press. C. Pasquetti.

Extrusion press utilizing a number of pairs of toothed wheels which engage and force the material through under pressure, e.g. three pairs of gears are arranged to feed the plastic material in series arrangement into a die-chamber of more or less conventional design.

B.P. 638,376. Appl. 7.8.47. Conv. (U.S.A.) 16.4.43. Acc. 7.6.50.
Improvements in tools for welding non-metallic thermoplastic materials. W. M. Philips, Jr. To: Udylite Corp.

Electrically heated welding torch for the welding of thermoplastic sheet material, combined with a follow-up roller to press down a strip of material which is laid over and welded to the adjoining edges of the sheets. The complete unit slides along on wheels and the gas blast can be controlled to suit the welding speed.

B.P. 638,416. Appl. 19.11.46. Acc. 7.6.50.
Treatment of porous thermosetting resin products. M. Goldstaub. To: Dunlop Rubber Co., Ltd.

Refers to impregnation of cellular materials with an ester plasticizer in order to prevent mechanical damage owing to cell breakdown.

B.P. 638,434. Appl. 14.7.47. Conv. (U.S.A.) 20.8.46. Acc. 7.6.50
Flame-resistant finish for fibrous cellulosic materials To: American Cyanamid Co.

Amino-triazine pyrophosphate salts are used as flame-retarding agents for resinous cellulosic compounds.

B.P. 638,516. Appl. 6.6.47. Conv. (Holland) 15.6.46. Acc. 7.6.50.
Polymerizable esters and polymers thereof. To: N. V. de Bataafsche Petroleum Mij.

Refers to glycidyl allyl diesters of dicarboxylic acid.

B.P. 638,530. Appl. 14.10.47. Conv. (France) 14.10.46. Acc. 7.6.50.
Artificial sponges. To: Sponcel, Ltd.

Refers to manufacture of viscose sponges.

B.P. 638,531. Appl. 30.10.47. Conv. (U.S.A.) 30.10.46. Acc. 7.6.50.
Compositions suitable for film casting and like applications. To: British Celanese, Ltd.

B.P. 638,567. Appl. 17.7.47. Conv. (U.S.A.) 25.5.40. Acc. 14.6.50.
Plasticized vinyl halide compositions. To: B. F. Goodrich Co.

Refers to plasticizers for vinyl materials. Liquid esters of 4-cyclohexene—1, 2—dicarboxylic acid are used and increased resistance to discoloration of the plastic is claimed.

B.P. 638,570. Appl. 22.7.47. Conv. (U.S.A.) 1.3.41. Acc. 14.6.50.
Plasticized vinyl polymers and process of plasticizing same. To: B. F. Goodrich Co.

Refers to methods of introducing plasticizers into vinyl resins.

B.P. 638,572. Appl. 30.7.47. Conv. (U.S.A.) 17.1.46. Acc. 14.6.50.
The pearl polymerization of vinyl compounds. W. P. Hohenstein.

B.P. 638,640. Appl. 16.7.47. Conv. (Holland) 31.7.46. Acc. 14.6.50.
Emulsion polymerization of polymerizable substances. To: N. V. de Bataafsche Petroleum, Mij.

B.P. 638,742. Appl. 21.11.45. Conv. (France) 3.5.41. Acc. 14.6.50.
Thermoplastic materials. To: Cie. Générale d'Electricité.

Rubber-like product with good elastic properties based on bitumen or coal tar mixed with a thermoplastic synthetic resin and a gellifying agent. Application for the insulation of electric cables, etc.

B.P. 638,774. Appl. 23.2.48. Acc. 14.6.50.
Production of decorative artificial films and sheets. C. Ford. To: Courtaulds, Ltd.

Wrinkled decorative sheet of varying thickness, of which the basis is a transparent, solvent-soluble, film-forming material, wherein the crests or thicker portions of the sheets are rendered no longer transparent by agglomerations of one or more insoluble pigments within the crests, thus producing a mottled appearance.

B.P. 638,951. Appl. 8.3.48. Conv. (Sweden) 8.3.47. Acc. 21.6.50.
Method of making organic silicon compounds. To: Mo Och Domsjo A.B.

Refers to plant for the production of organic silicon compounds and describes method of operation of the plant.

B.P. 638,955. Appl. 25.3.48. Acc. 21.6.50.
Extrusion processes and apparatus therefor. J. R. Cann. To: Imperial Chemical Industries, Ltd.

Improved die system for plastic extruding machines, in particular for the extrusion of materials with low plasticizer content, such as methyl methacrylate or rigid p.v.c. Means are provided for lubricating under pressure the internal surfaces of the dies in order to improve the flow conditions for the material to be extruded.

B.P. 638,977. Appl. 23.8.46. Conv. (France) 15.2.45. Acc. 21.6.50.
Method and apparatus for producing sheets, films, foils and the like of plastic materials. R. Blume. To: S. A. des Manufactures des Glaces. St. Gobain.

Design of extrusion dies for screw-type plastic extruding machines. The dies have cross sections which change gradually from an annular space to a flat slot, and it is claimed that tubes of extremely small wall thickness can be extruded in this manner. Film is manufactured by extruding a tube which is subsequently slit and folded open.

B.P. 638,981. Appl. 4.10.46. Acc. 21.6.50.
Production of thermoplastic mouldings such as artificial teeth. R. Mather.

Production of vari-coloured mouldings by means of the transfer moulding process. Preforms consisting of several strata in different tints are loaded into the moulding machine for transfer into the individual mould cavities. Particularly adapted to manufacture of artificial teeth.

B.P. 638,992. Appl. 5.3.47. Conv. (Italy) 12.7.40. Acc. 21.6.50.
Process and apparatus for the preparation of thermoplastic powders. C. Pasquetti.

Production of thermoplastic powders comprising the following stages: Injection of a plasticized mixture by means of a number of nozzles into a cylindrical container, feeding from the container into a worm extruder, extrusion under pressure through a multihole dieplate to form individual strands or ribbons which are cut up into small parts prior to use.

B.P. 639,006. Appl. 21.6.48. Acc. 21.6.50.
Injection moulding machines. To: Projectile and Engineering Co., Ltd.

Injection moulding machine with an injection nozzle formed on the front of an injection cylinder which together with its nozzle is adjustable, by sliding but not by rotation, relative to the transverse frame member.

B.P. 639,025. Appl. 19.11.47. Acc. 21.6.50.
Emulsions of ethylene polymers and interpolymers. L. Seed. To: Imperial Chemical Industries, Ltd.

Refers to manufacture of aqueous emulsions of polyethylene at high temperatures and pressures.

B.P. 639,084. Appl. 8.1.48. Conv. (U.S.A.) 8.1.47. Acc. 21.6.50.
Electro-deposition of solid ethylene polymers. To: E.I. Du Pont de Nemours and Co.

Anodic deposition of polythene from aqueous solutions containing an amic acid-type dispersing agent. Application to covering of plating jigs with polythene.

B.P. 639,111. Appl. 2.2.43. Acc. 21.6.50.
Manufacture of electric circuits and circuit components. H. V. Strong and P. Eisler. "Printed circuit" technique. Circuit components such as resistors, capacitors, etc., are produced by printing with conductive or semi-conductive inks on sheets of plastic material.

B.P. 639,144. Appl. 2.6.47. Conv. (U.S.A.) 1.6.46. Acc. 21.6.50.
High-frequency electrical heating apparatus. To: British Thomson-Houston Co., Ltd.

Di-electric heating of synthetic resins and other di-electric materials by means of ultra-high-frequency devices. A resonant or non-resonant wave guide is used for application. Frequencies of the order of 2,000 Mc/s can be used for heating.

B.P. 639,160. Appl. 29.10.47. Conv. (U.S.A.) 30.10.46. Acc. 21.6.50.
Dyeing thermoplastic resin textile articles. T. A. Feild, Jr., and A. G. Schoonover. To: Carbide and Carbon Chemical Corp.

Refers to dyeing of textile articles made from resinous copolymers of vinyl chloride and acrylo-nitrile.

B.P. 639,161. Appl. 30.10.47. Acc. 21.6.50.
Colouration of cellulose acetate. G. D. Sutton and O. Boothby. To: T. E. Marchington and Co., Ltd.

B.P. 639,185. Appl. 24.5.45. Conv. (U.S.A.) 25.5.44. Acc. 21.6.50.
Adhesives for bonding plasticized polyvinyl halide containing resins and articles bonded thereby. To: United States Rubber Co.

Refers to heat activated polymerizable composition based on vinyl chloride and vinyl acetate.

B.P. 639,199. Appl. 14.2.47. Acc. 21.6.50.
Production of patterned sheets of polymeric resin. To: Imperial Chemical Industries, Ltd.

Refers to press-polishing method for sheets of polythene, polystyrene, Perspex and the like. Carried out in a chamber in the presence of monomeric substance at suitable temperatures. Either high polish or any other patterned surface can be produced in this manner.

B.P. 639,266. Appl. 31.7.47. Acc. 28.6.50.
Coloured cellulose ester or ether products. British Celanese, Ltd. Comm. from: Celanese Corporation of America.

Dyes for the coloration of cellulose acetate, etc., mainly of the amino-hydroxy anthraquinone type.

B.P. 639,306. Appl. 5.4.48. Conv. (U.S.A.) 3.4.47. Acc. 28.6.50.
Manufacture of solid polymers of ethylene. E. I. du Pont de Nemours and Co.

Production of polythenes with better mechanical properties and higher melting point (125 degrees-132 degrees C.) is claimed by the use of very high pressures (5,000-20,000 kg./cm.^{2}) for the polymerization process.

B.P. 639,327. Appl. 9.1.47. Conv. (U.S.A.) 5.2.46. Acc. 28.6.50.
Method of preparing opaque films from synthetic linear polyamide compositions. Munising Paper Co.

Pigment free opaque films based on mixtures of self-polymerized omega amino caproic acid, water and ethyl alcohol.

B.P. 639,367. Appl. 4.6.48. Conv. (U.S.A.) 7.6.47. Acc. 28.6.50.
Manufacture of halogenated amines. British Celanese, Ltd.

Manufacturing process for 2 : 6—dihalogen—4-nitro anilines.

B.P. 639,411. Appl. 27.6.47. Conv. (France) 18.6.46. Acc. 28.6.50.
Method and machine for production of multiple packages of plastic material for various products. C. Nicolle.

Apparatus for manufacture of multi-cellular packs from sheet material such as polyvinyl chloride or cellulose acetate. Press tools with appropriate cavities and male dies are provided for the forming process; forming and cutting-off is carried out simultaneously.

B.P. 639,510. Appl. 9.8.48. Conv. (U.S.A.) 28.8.47. Acc. 28.6.50
High-frequency electrical heating methods and apparatus therefor. To: British Thomson-Houston Co., Ltd.

Welding torch which uses a gas stream heated by a high-frequency discharge. The H.F. generator works at 1,000 Mc/s and has a magnetron oscillator capable of supplying an output of 5 kW.

B.P. 639,538. Appl. 2.5.46. Conv. (Italy) 9.12.43. Acc. 28.6.50.
Apparatus for manufacturing reinforced tubes from thermoplastic materials by extrusion. Lavorazione Materie Plastiche.

Continuous extrusion of thermoplastic tubes, which are reinforced by a metal wire in spiral form. Special die system, which permits the feeding of the reinforcing wire simultaneously with the extrusion of the plastic material.

B.P. 639,551. Appl. 12.2.47. Conv. (U.S.A.) 6.7.47. Acc. 28.6.50.
Methods of preparing poly-basic polymers from polysaturated fatty acids and the poly-basic polymers resulting therefrom. To: Emery Industries Inc.

B.P. 639,557. Appl. 12.3.47. Acc. 28.6.50.
Production of sheets and other bodies of polymeric resin. A. L. L. Tompsett. To: Imperial Chemical Industries, Ltd.

Production of laminated sheets based on soaking the filler material with monomeric or partially polymerized resin dough and polymerizing in moulds under heat.

B.P. 639,575. Appl. 9.7.47. Acc. 28.6.50.
Uniting of polythene and the like substances with other materials. R. C. Mildner and A. A. W. Barnes. To: Telegraph Construction and Maintenance Co., Ltd.

Method of bonding polythene to metals consists of (1) applying a thin layer of polythene by spraying; (2) moulding under heat and pressure the thicker polythene structure to the sprayed layer. Used for jointing lead-covered polythene cables, for instance.

B.P. 639,592. Appl. 12.9.47. Conv. (U.S.A.) 25.9.46. Acc. 28.6.50.
Resinous compositions, particularly adapted for use as a mould. B. F. Goodrich Co.

A "hot-melt" composition used for the manufacture of flexible moulds, consisting of polyvinyl chloride, tricresyl phosphate and lead stearate. Pouring temperature 300 degrees F.

B.P. 639,593. Appl. 20.9.47. Acc. 28.6.50.
Inflatable articles and valves therefor. H. Senior and G. S. Cope. To: Cascelloid, Ltd.

Special type of non-return valve for the sealing of inflatable toys made from p.v.c., consists of a p.v.c. disc, which is welded on to the body of the toy. A cellulose acetate or other type of rigid disc is held between the two layers of p.v.c. Holes are arranged in both articles in such a manner that inflation and deflation can be carried out at will.

B.P. 639,614. Appl. 11.11.47. Acc. 5.7.50.
Production of seam-welded articles. A. H. H. Hytch. To: Dunlop Rubber Co., Ltd.

High-frequency welding of plastic articles combined with cutting along the welded contour. A welding electrode is used which contains a spring loaded cutting device which becomes operative after the weld has been made.

B.P. 639,716. Appl. 4.2.47. Acc. 5.7.50.
Joining of sheet plastic material by R.F. energy. W. G. Roberts. To: Airmec Laboratories, Ltd.

High-frequency welding electrodes for the welding and simultaneous cutting of sheet plastics. A cutting knife is attached to the top electrode, whilst the bottom electrode is provided with a groove to receive the cutting knife. The knife is insulated from the top electrode.

B.P. 639,718. Appl. 3.3.47. Conv. (U.S.A.) 20.3.46. Acc. 5.7.50.
Rubber-like vulcanizates. D. C. Cline. To: Firestone Tire and Rubber Co.

Low temperature resistant compositions of butadiene-styrene and GR-S materials.

B.P. 639,729. Appl. 23.7.47. Conv. (Holland) 12.8.46. Acc. 5.7.50.
Polymerizing substances in the emulsified state. To: N. V. de Bataafsche Petroleum Mij.

B.P. 639,777. Appl. 14.2.47. Acc. 5.7.50.
Compositions containing vinyl chloride and vinylidene chloride polymers and copolymers. To: Standard Oil Development Co.

Special plasticizers for vinyl resins.

B.P. 639,885. Appl. 15.12.47. Acc. 5.7.50.
Coloration of cellulose acetate textile fabrics. British Celanese, Ltd. Comm. from: Celanese Corp. of America.

Dyes incorporating ethyl alcohol or other lower aliphatic alcohols.

B.P. 639,893. Appl. 30.12.46. Acc. 5.7.50.
Improved nylon compositions. To: I.C.I., Ltd.

Impregnation of nylon yarn with compositions containing hypophosphorous acid is claimed to overcome discolouration by heat of the yarns.

SUCCESSFUL DESIGNING FOR PLASTICS MOULDING

(*Continued from page* 260.)

noted in what manner the wall thickness is thereby maintained more or less uniform in thickness around and underneath the hole bosses. By this method the raised flange portion at the top of the box can be retained in the simplest form.

The internal walls of the component are left perfectly straight, and the task of forming the mould cavity to provide for such external bossing on the component will be extremely simple and straightforward. The cores would be mounted in a mould exactly as with the preceding examples. In many cases the outward appearance of the box component would be improved by the interruptions thus provided on the perfectly flat external surfaces.

Of the four designs given at Fig. 3 the example D will probably be found the most effective, simple, and economical from both the component and mould manufacturing angles.

(To be continued.)

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